ME XVII MAY, 1917 NUMBER 5

THE AMERICAN MUSEUM JOURNAL

FOOD SUPPLY IN WAR TIME

DISEASES OF AFRICA —— WILD FLOWERS

THE OLD WEST —— MUSHROOMS AS FOOD

THE CROCKER LAND PARTY SAFE

ROOSEVELT IN FLORIDA

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The American Museum of Natural History

Joseph H. Choate

THE AMERICAN MUSEUM JOURNAL

VOLUME XVII MAY, 1917 NUMBER 5

Reminiscences of a Founder of the American Museum

THE CITY OF NEW YORK IS THE ABSOLUTE OWNER OF THE BUILDINGS. THE MUSEUM OWNS THE COLLECTIONS—AN ARRANGEMENT WHICH HAS STEADILY FOSTERED MORE AND MORE CLOSE AND CORDIAL RELATIONS BETWEEN THE MUSEUM AND THE PEOPLE

By JOSEPH H. CHOATE

YOU ask me to contribute for the JOURNAL something about the beginnings of the American Museum, in which, as the only surviving founder, I had something to do.

Nobody ever dreamed at that remote time, nearly fifty years ago, that the American Museum of Natural History would ever reach its present vast proportions and splendid utility. New York was far behind other American cities in this development of knowledge and science. Sporadic efforts had indeed been made to establish a museum where the collections of New York's learned naturalists might be gathered, but thus far Philadelphia and Boston had been allowed to lead. I remember that, when

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IN MEMORIAM.—We have the voice of Mr. Choate with us today, in a loyal and proud word for the institution he helped to found. With other trustees he has for nearly fifty years had a feeling of fatherly ownership and responsibility as year after year he watched the organization rise from its infancy to its present commanding stature in science and education. And for the same fifty years the American Museum on its side has looked upon him with affectionate admiration, and, feeling a contented mind under the protection of this representative of the law, the foremost advocate of the American Bar, has been able to devote itself unreservedly to the work for which it was founded.

It is a satisfaction to remember how greatly Mr. Choate enjoyed the Museum he had helped to found. He was a very frequent visitor up to the last days of his life. I recall one occasion when his enjoyment was very evident. It was one Saturday forenoon in the early spring of 1917, and about time for the "Children's Lecture" to begin in the auditorium of the Museum. Outside, the weather was gray, with a cold wind; inside, where many hundred children had come gaily trooping, there was a great sunshine of adventure and anticipation of the journeyings they were to make into the jungleland of Africa—or was it into the American wildernesses of our wild flowers or birds? I forget, I fear, what was the subject of that particular children's lecture.

Then he came in smiling, among the children, and many people both young and old whispered "Mr. Choate," with accents of reverence for his great name and exultation that they were in an audience of which he was to be a member. He was in one of his gayest moods, it seemed. He was holding a grandchild by each hand, and I veritably believe he was quite as filled with fun and anticipation of the pleasure ahead as were the children. After the lecture and after they had viewed some of the Museum exhibits, accompanying Mr. Sherwood, head of the department of education of the Museum, one of the children said exultingly, "Are we not lucky to have grandpa for a grandpa!" She had quite the right point of view. And the American Museum could have said with equal sincerity and emphasis, "We are immeasurably glad that Mr. Choate is our founder, trustee, and friend."

I regret that the following article, written by Mr. Choate very shortly before his death, was not published, together with an expression of the Museum's appreciation of his wise counsels and his loyalty through the many years, while he could yet see them. The portrait, he sent as his favorite among recent pictures of himself. It conveys the magnetism of his personality in large degree—with its intellectuality and benignity in the upper face and its pathos and humor about the mouth. It is true that from his standpoint at least it could scarcely have mattered that they were not published in time. His last days were full of

it had finally been resolved to establish the American Museum, the first thing was to get a charter from the state, and I went in company with the late William E. Dodge to Albany to consult with members of the Legislature about granting it. To our surprise we found that the matter of granting us a charter depended upon the decision of William M. Tweed, who was then practically in supreme control of the Legislature. We hardly anticipated that he would put no obstacles in our way, but wonderful to tell, he received us really with enthusiasm, and said that he entirely approved of the project as an educational measure and that he would do whatever we wanted. Consequently, we obtained without any delay, or expense, or trouble the much desired charter.

A few men of large wealth were interested in the project, being amateur lovers of natural history in one or another department, but there was no such splendid scientific supervision as the Museum now enjoys in its president and its various curators. Some of the gentlemen interested in the Museum in that early day had little collections of their own which they were very glad to contribute, and also money to spend for such benign purposes; and I suppose that they wanted me to become one of the founders so that they might have a legal advisor to fall back upon, in case of need, who should be one of their own number, and I very gladly joined, although having nothing to contribute in the way of collection or of money.

Professor A. S. Bickmore fortunately was the great promoter of the organization of the Museum. He had been a pupil of Agassiz, and was besides a young man of energy and persistence. It was he who instigated the various gentlemen of large wealth, of whom I have spoken, to unite for the Museum's formation and first organization. He labored incessantly in season and out of season, and in any history of the American Museum he is to be remembered as its most effective early promoter.

No one thought at that time that a great democratic city like New York would ever contribute two hundred thousand dollars a year for what then seemed such a luxury as a Museum of Natural History or a Museum of Art,

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vivid personal enjoyment because of his opportunity to use his eloquence and argument to give all that was in his power to the two causes nearest his heart: the new desire of his vigorous patriotism for the entrance of America into the war on the side of the Allies, and his ever-abiding desire as a diplomat for a closer union of France and England with his home country. Also during his last days, it is good to remember, there were reached out to him from all sides the homage and love of friends and of the public, since as the chief citizen of New York City he had been chosen despite his eighty-five years to represent the government in greeting the English and French Commissions.

The patriotism and loyalty of Mr. Choate, which made him give himself on this occasion, even though he knew it to be at the risk of his life, recall his many patriotic utterances of the past, so eloquent of the situation today. Some of them stand as propheey and command: "Our frigates may rot in the harbor—our ironclads may rust at the dock, but if ever again the flag is in peril, invincible armies will swarm upon the land, and steel-clad squadrons leap forth upon the sea to maintain it. If we only teach our children patriotism as the first duty and loyalty as the first virtue, America will be safe in the future as she has been in the past. . . . We can always be sure of fleets and armies enough. But shall we always have a Grant to lead the one, and a Farragut to inspire the other? Yes, on this one condition, that every American child learns from his cradle that his first and last duty is to his country, that to live for her is honor, and to die for her is glory."

In the death of the Honorable Joseph Hodges Choate the American Museum has suffered a loss of almost irreparable proportions. None too frequently so far in the history of human evolution have there been combined in one man so many rare qualities of mind and character,—high mentality, great industry, sincerity, high purpose and unselfishness—with energy, simplicity, and a gay humor even to the end of five and four score years. The institution he founded sincerely mourns his death.—THE EDITOR.

and I do not know that any city in America had at that time ever contributed a dollar for any such purpose. In the New York effort we lived from hand to mouth at first, although the gentlemen of whom I have spoken certainly contributed very liberally to the support of the infant institution. It was not, however, until the first building was erected by the city under the authority given by the Legislature that we began to realize what an important project we had in hand.

In the meantime we lived as best we might in quarters hired for the purpose, the old Arsenal Building near the south end of Central Park, and the Museum at first was certainly a very small affair. Only the enthusiasm and unfailing generosity of the more wealthy among the trustees, who year after year put their hands into their pockets to make up the deficit, kept the tottering infant alive during these early years of struggle.

As usual where either individuals or museums become known as collectors, miscellaneous collections of every description came crowding in faster than they could be taken care of. We strove first to gain public attention and confidence by a well-ordered exhibition of our most attractive objects, storing the others away to await future developments. Forty-four thousand dollars were raised the first year by the trustees and their friends, and only five thousand people visited the Museum to reward their efforts. Every day it became more and more obvious that it was quite impossible to build up by private means alone a great museum worthy to compete with the museums of Europe. When we fully realized this, we sent to the Legislature a lengthy petition, signed by forty thousand citizens, asking that a building be erected by the city. Manhattan Square, consisting of eighteen acres, was at that time a remote and almost inaccessible tract of land. This land was granted as the site for the first building. The corner stone was laid, I well remember, in the presence of the President of the United States, accompanied by members of his cabinet, the Governor of the state, and the Mayor of the city. On the twenty-second of December, 1877, the building was formally opened.

The contract entered into at that time between the city and the trustees of the Museum has subsisted without change for forty years. Contracts of the city with other great institutions such as the Metropolitan Museum of Art and the New York Zoölogical Society have been closely modeled upon it. The policy embodied in this contract secures equal advantage to the institution and to the public. It provides for the permanent occupation by the American Museum of all the buildings erected or to be erected in Manhattan Square, and for a free exhibition within the buildings of all our collections, under regulations agreed upon. The city of New York, therefore, is the absolute owner of the buildings, and the American Museum is owner of the collections —an arrangement which has fostered delightful and beneficial relations, steadily growing more close and cordial, between the Museum and the people.

Now the American Museum has grown with incredible speed to wholly unexpected magnitude, and I have every reason to believe that it is now regarded, and in the future will be still more highly valued, as one of the great educational institutions of the city, worthy of the support of its citizens and quite as important as the public schools, as an institution whose maintenance shall be provided for out of the public funds.

OFF THE COAST OF FLORIDA

Theodore Roosevelt, ex-President of the United States and man of vital personality in contact with men, is also a humble field naturalist. The two gopher tortoises (*Testudo polyphemus*) were caught on sandy islands near Punta Gorda. They are thought to live to be very old. They tame easily and show considerable intelligence. They are close relatives of the almost extinct species of the Galapagos Islands in the Pacific, the "giant tortoises," survivors of an age when many reptiles grew to astounding proportions. It is thought possible that the "giant tortoises" live several hundred years

Notes on Florida Turtles[3]

By THEODORE ROOSEVELT

Written in camp near Punta Gorda on the Gulf of Mexico

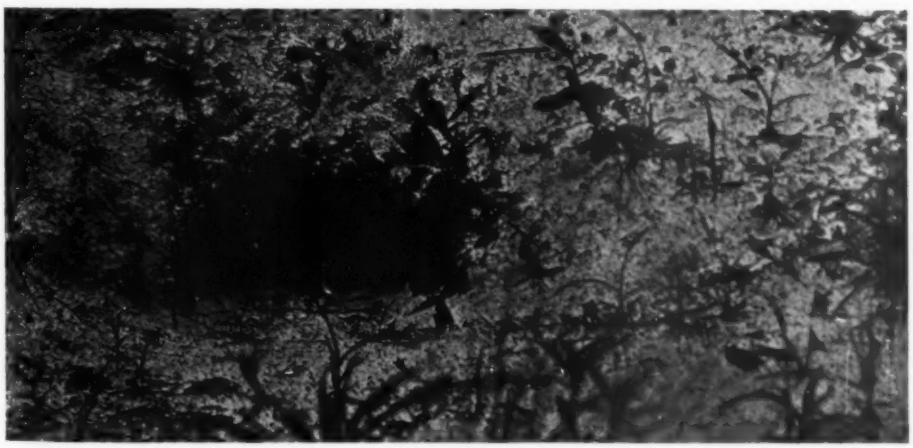
DURING the last week of March, 1917, I spent a few days near Punta Gorda, Florida, on a trip after devilfish, being the guest of Mr. Russell J. Coles, whose piece on devilfish in this magazine[1] was the very best thing of its kind that has ever been written.

One day we visited an island which, while I was President, was made into a bird reserve[2] on the initiative of the Audubon Society. We forced our way through the thick belt of mangroves which fringed the island to the smaller area of higher land inside, on which grew Florida figs, pawpaws, and one or two other kinds of tropical trees. Here to our surprise we came across a burrow. I had no idea what creature had made it, but Captain Jack McCann, a native Florida fisherman who was with us, at once said it was the burrow of a gopher. My book knowledge enabled me to realize that he was speaking, not of the burrowing pouched rat—which in Florida is rather absurdly called "salamander"—but of a big land tortoise. The burrow was shallow and we speedily dug out the occupant. It was a fairly large specimen, weighing 11½

[1] See AMERICAN MUSEUM JOURNAL, Vol. XVI, No. 4.

[2] One of several small islands in Charlotte Harbor established as government reservations during Roosevelt's administration. The first Federal bird reservation in the United States was made by Roosevelt through his authority as President. Somewhat later a law was passed by Congress vesting in the President power to set aside government lands as bird reserves. No less than fifty-one such reservations were established during Roosevelt's tenure of office, covering many parts of the United States from Florida to Oregon.

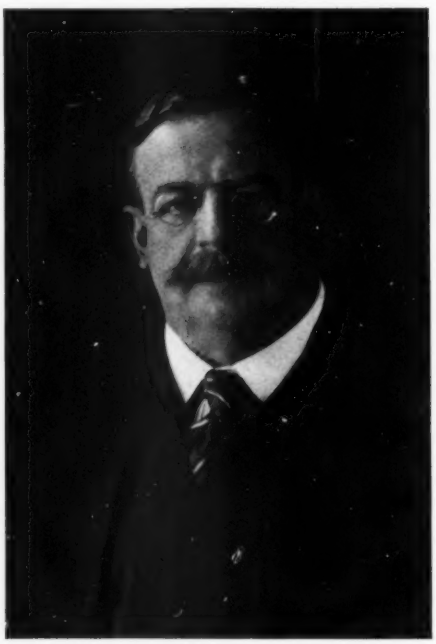
[3] It chances that Dr. G. Clyde Fisher, of the scientific staff of the American Museum of Natural History, has given considerable field study to the gopher tortoise (*Testudo polyphemus*) of Florida. It is therefore a pleasure to append to Colonel Roosevelt's valuable record of observations a brief article covering some of Dr. Fisher's personal experiences with this species.—THE EDITOR.



The gopher tortoise digs its own burrow, which may be twenty to thirty feet in length. The sand is heaped at the doorway, and the burrow of course just fits the turtle which has done the digging, the floor being shaped by the flat plastron and the roof arched in just the curve of the carapace. The "gopher snake" (*Spilotes corais couperi*) goes in and out the burrows, no doubt on friendly terms with the owners, and the "gopher frog" (*Rana æsopus*), also on friendly terms, sits in the doorway at dusk and hides in the retreat if an enemy appears. One of the first acts of the baby gopher tortoise after coming from its egg is to dig itself a burrow, a miniature of its parent's home

pounds, with a shell 13½ inches long, 9 inches wide, and 5¼ inches deep.[1] (Later we secured a small specimen on Captiva Island, which weighed 4¾ pounds, was 8½ inches long, 6 inches wide, and 3½ inches deep.) How this big tortoise got to the island is something of a mystery, as the species is entirely terrestrial; it must have been drifted out by some accident of flood or storm.

The gopher tortoise is a vegetable feeder and its flesh is good eating. We found the meat delicious. Unlike our common box tortoise the plastron is not hinged, but when alarmed, the creature draws in the head completely out of sight, and tucks back the feet so that only the rough, flat, scaly surfaces are exposed. The turtle is then practically immune from attack. I was much interested to be told by Captain McCann that he had once found a diamond-back rattlesnake with a small specimen of this species of tortoise inside of him. Captain McCann is an accurate and trustworthy observer. I had supposed that rattlesnakes fed exclusively on birds and mammals.



Mr. Russell J. Coles, whose observations on turtles are quoted in the article, and whom Colonel Roosevelt accompanied as guest on his recent devilfish hunt off the west coast of Florida. Mr. Coles is scientific authority on the devilfish (*Manta birostris*), as well as the greatest hunter of the species

In the fringe of mangrove swamp on the island we got three small diamond-back terrapin of the Gulf variety.

Out in the bay we once or twice saw loggerhead turtles. Mr. Coles and the professional fishermen who were with us related many instances of attacks they had witnessed by sharks on full-grown sea turtles, both the loggerhead and the green turtle. I knew that sharks gulped down small turtles whenever they met them, but I had not realized that they attacked the big ones. My companions, however, assured me that nearly half of the full-grown turtles which they had caught showed signs of having been attacked at one time or another by sharks. Usually this meant that one flipper was gone. In one case the turtle had lost two flippers, obviously at different times. On one occasion Captain Jack was attracted by a great commotion in the water and sailed toward the scene. He found a very large shark with a huge loggerhead turtle in his mouth, the turtle frantically waving all four legs while the shark shook its head in the effort to get its teeth through the shell. The final outcome he was not able to observe. Mr. Coles said that on several occasions he

[1] The gopher tortoise (*Testudo polyphemus*) has been known to attain a length of eighteen inches, although the average size is probably in the neighborhood of one foot.

had seen sharks attack these big turtles. The turtle would raise itself out of the water and splash with all four flippers, frightening off the shark for a moment; but sooner or later the turtle would attempt to escape by diving, and then the shark, ordinarily, would seize it from behind, shearing off one flipper, and sometimes leaving a semicircular mark on the shell itself.

On one occasion Mr. Coles saw a great shark, which he provisionally identified as a white shark, attack and seize a big loggerhead turtle, disappearing with it. Next day he found the damaged turtle on the surface of the water unable to dive, and harpooned it. He found a semicircle twenty-four inches across and twelve inches deep, torn out of the two shells on one side of the turtle, which gives a good idea of the width and depth of the shark's bite.

The strength of the gopher tortoise we captured was great. If I stood on it, it would start to walk off with me, not seeming to be bothered by the weight.

"GOPHER PULLING" IN FLORIDA

GOPHER PULLING is a unique sport. Although it may be looked down upon by those sportsmen who enjoy shooting wild fowl on the wing, it is recognized by the legislators, for in Florida there are laws regulating the open and close seasons, and fixing the minimum size of gophers that may be taken,[1] just as there are for brook trout and black bass in the northern states.

In the southeastern states, the name "gopher" is not applied to a ratlike rodent, as it is in the upper Mississippi Valley and the western states. This is true in spite of the fact that in Florida and neighboring states there is a true pocket gopher (*Geomys tuza*)—but it is known to all the inhabitants as the "salamander." How this inappropriate name became attached to the gopher, it would be interesting to know.

While the true gopher of Florida is universally known as a "salamander," the animal, which in this section is known as a "gopher," is really a tortoise or turtle. The gopher tortoise (*Testudo polyphemus*) is strictly terrestrial and lives in burrows which it digs for itself, the forelegs being especially well fitted for excavating. The burrows are always dug in well-drained, sandy soil of the pine-barren regions, and are so abundant in western and central Florida that several burrows can often be found on a single acre of the higher parts of the "piney" woods. The burrows are from twelve to thirty feet in length, the greater number being from fifteen to twenty. They are usually quite straight, although sometimes stumps, roots, or other obstructions have made crooks or turns necessary. They slope gradually downward so that the lower end is usually about five or six feet lower than the entrance. Gopher burrows are a source of danger to hunters on horseback who follow the hounds in pursuit of the gray fox, and to the woods-rider of the turpentine orchard. Many a running horse has fallen and thrown its rider by stepping into a gopher burrow. The gopher's burrow is frequently resorted to by rabbits, skunks, gray foxes when hard pressed, and even by diamond-back rattlesnakes[2]—just as a rabbit adopts the burrow of a woodchuck in the northern states.

The gopher tortoise is herbivorous, and feeds upon grass and the leaves of various plants. An examination of the digestive

[1] In the three most western counties of Florida, by the provisions of an act passed in 1909, it is unlawful to take or sell any gophers during the months of May, June, and July, and by the same law "to take or sell them of a size less than nine (9) inches in length of the under shell" is prohibited.

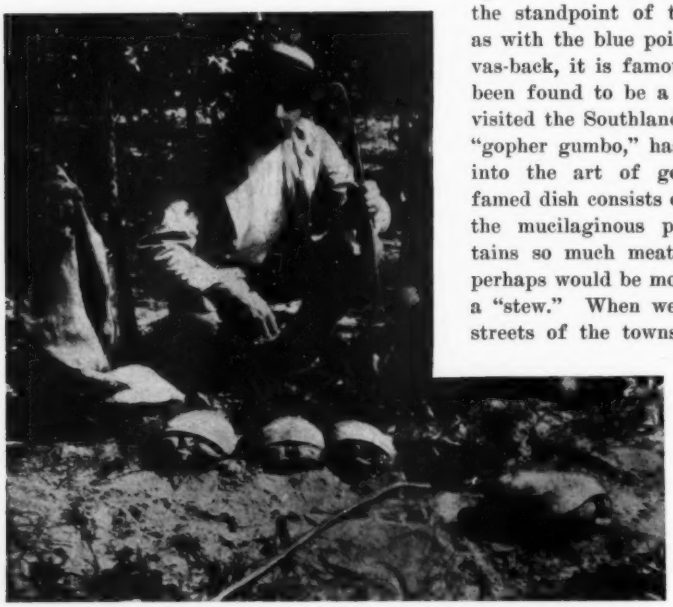
[2] Living in the burrows with the gophers we found two interesting animals, one a parasite and one a commensal insect. The former was the large gopher-tick (*Amblyomma tuberculatum* Marx), the latter was the gopher-cricket (*Ceuthophilus latibuli* Scudder). This is really a cricket-like grasshopper which is closely allied to the colorless and blind cave crickets. Had we been entomologists, we should probably have observed several other peculiar insect guests in the gopher burrows. (See Hubbard, Henry G., The Insect Guests of the Florida Land Tortoise, *Insect Life*, 6 : 302–315, May, 1894.)

The flesh of the gopher tortoise is very good eating. In "gopher pulling," a grapevine with an iron hook at the end is thrust into the burrow, and the unfortunate occupant is pulled from its retreat

tracts of a number captured in western Florida showed the chief food to be the common wire grass (*Aristida* sp.). I have the additional proof of having seen the gopher eating wire grass (which, by the way, is the most easily available food where the gopher is found). With its sharp mandibles it crops this tough grass with as great ease, apparently, as might an animal with sharp, chisel-like teeth. It swallows the grass in pieces nearly two inches long, and the wire grass is so stiff that it must be like swallowing toothpicks.

The female gopher lays her eggs at the mouth of the burrow, I have been told by reliable observers, and covers them in much the same way as does the green sea turtle. The number of eggs is surprisingly small, being only from three to six at a laying.

In the daytime, the gopher is frequently seen traveling across the country, but I think it is inclined to be nocturnal in its habits. The fame of the gopher, however, rests not upon its habits which are interesting from the standpoint of the naturalist, but just as with the blue point, or pompano, or canvas-back, it is famous because the flesh has been found to be a delicacy. Whoever has visited the Southland, and has not yet eaten "gopher gumbo," has not yet been initiated into the art of good eating. This far-famed dish consists of a soup thickened with the mucilaginous pods of okra, and contains so much meat of the gopher that it perhaps would be more appropriate to call it a "stew." When we are walking along the streets of the towns and cities of Florida, it is a common thing to see on the sidewalk in front of grocery stores crates of live chickens, for the South is surely the land of fried chicken; but what impresses a Northerner much more are the crates containing gophers for sale.



"Gopher pulling" is regulated by law in Florida and has its open and close seasons as have brook trout and black bass fishing in the North

These are for the gopher gumbo. I am sure, however, that when I accepted an invitation to accompany two friends on a gopher-pulling expedition, it was my instinct as a naturalist that prompted me. To get tackle for this sport we went out to a bayhead and cut two or three bullace grapevines (*Vitis rotundifolia*), these lianas being common in such places and along streams, often growing to the tops of trees more than one hundred feet in height. For our purpose, we selected several sections of vine, each as straight as possible and a little less than an inch in diameter. With a section thirty feet long, of almost uniform diameter throughout its length, one could reach to the bottom of the longest gopher burrow. Upon one end of each piece of grapevine, we fixed a blunt hook made of iron about a quarter of an inch in diameter. This was fastened to the grapevine with copper wire, as any kind of twine would have been worn out by the friction against the sharp grains of sand in the walls of the burrow. The end of the hook was semicircular in shape, describing a curve about an inch in diameter.

Armed with such tackle, we sallied forth looking for gopher burrows, and when one was found, the end of the grapevine upon which the hook was fastened was pushed into the burrow until the hook reached the inner end. The elasticity of the grapevine permitted it to follow any turns which might be in the burrow. When the hook came up against the end of the burrow, the vine was twisted a part of a turn, and then a sharp pull was made. If there was a gopher in the burrow, not many twists and subsequent pulls of the vine were usually required to hook the gopher either by the carapace or the plastron. Then by a steady pull it was soon brought to the surface and placed in a bag. The hook did not penetrate the skin of the gopher and made no wound. If one relaxed the pull while a gopher was being drawn out of a burrow, it generally freed itself from the hook, probably by pushing the hook off with one of its feet. Then it retreated to the rear end of the burrow and had to be hooked again. With this apparatus, it did not take long to capture all that one could carry.[1] In fact, this method of capturing gophers is so efficient, that in parts of Florida it is forbidden by law, for the same reasons that certain devices for catching fish or for killing waterfowl are prohibited.

Another method of capturing gopher tortoises is by means of a box sunk at the entrance of the burrow, and lightly covered with twigs and pine "straw" which will give way when the animal attempts to walk over it on leaving the den. If the box is as much as eighteen inches deep, even the largest gopher will not be able to climb up the straight sides; and finding a gopher in one of these box-pits probably affords as much excitement as a trapper feels upon finding a prize in one of his traps. This method reminds one of the covered pits used by certain African tribes in capturing elephants.

Gophers are occasionally taken, it is true, outside their burrows. This is made easier by the fact that the animal moves slowly as do all terrestrial turtles. In watching the turtle plod along, one realizes the striking similarity in shape between its hind feet and legs and those of an elephant, a similarity which extends not only to shape, in fact, but also to manner of movement in walking.

Where gophers are found, the vegetation is usually sparse, so that it is possible to trail them by their tracks in the sand. In this way some specimens are taken. But no method furnishes as much excitement as "pulling," and hence it is the most popular, even if those who participate in it do return home with torn and soiled clothing and probably a few red-bugs or chiggers as souvenirs of the hunt.

G. CLYDE FISHER.

[1] The photographs illustrating "gopher pulling" were taken by Dr. G. Clyde Fisher.

What is most needed in regulating our food allowance is a knowledge of the calorie values of various foods relative to their cost. We should learn to buy food by the 100 calories rather than by the pound. (The foods shown above, apple pie, lettuce and tomato, asparagus, napoleon, fried eggs, chops and potato, are permanent and accurate wax models made in the preparation shops of the American Museum. See note, page 357)

The Conservation of Our Food Supplies in War Time

By T. G. HULL

A SPECIAL exhibit illustrating some of the principal problems of food conservation which confront the United States and the world was opened at the American Museum on May 23, as one contribution of this institution to the task of the National Defense Council, the preparation of our country to play its part in the great crisis.

Reports from various sources as to the condition of the world's crops have been conflicting and confusing. The percentage deficiency of last year's crops was small, the world's wheat crop being ninety-three per cent normal while other crops were also slightly below normal. The total deficiency, however, was enough to create a serious condition. The case is exactly analogous to that of the man on day wages with a large family. The reserve bank account is continually drained so low that the "docking" of even a part of a week's wages makes itself felt at the dinner table.

The underlying cause of food shortage in the United States is well illustrated in a picture painted for the special exhibition, of a young man leaving the farm for the city and its higher wages. Lack of farm labor, added to the demand from Europe for food, has so depleted the reserve on our farms and in cold storage that a real crisis now confronts us.

The outlook for the coming year is not too bright, the winter wheat crop on April first being but sixty-five per cent normal. To offset this a vigorous campaign has been carried on throughout the country for the planting of other foodstuffs, especially beans, corn, and potatoes. It has been estimated that a double yield of corn and potatoes, with a tenfold yield of beans, would tide us over another winter and allow us to do our duty by our allies.

The human body is chiefly made up of the four elements, carbon, hydrogen, oxygen, and nitrogen, but it also contains the following:

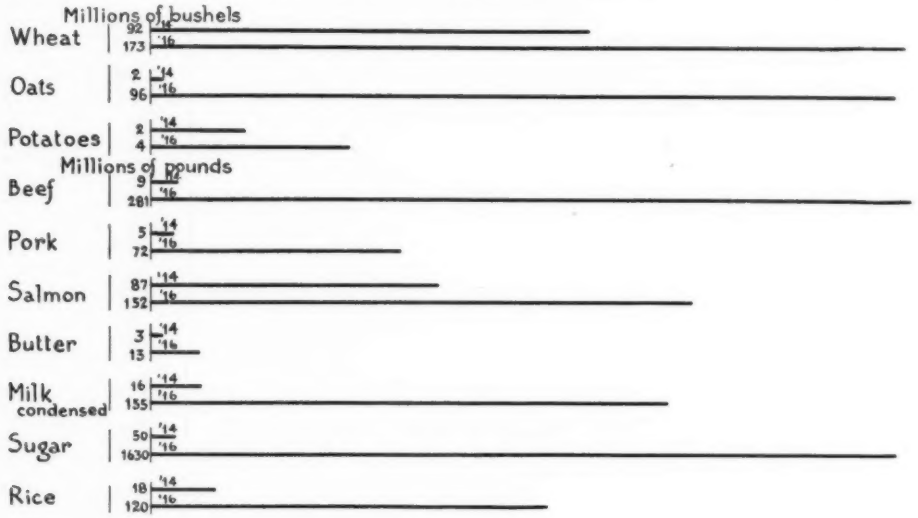
Calcium	3.75 lbs.	Magnesium	.10 lbs.
Phosphorus	1.7 "	Sulphur	.10 "
Potassium	.18 "	Silica	.10 "
Sodium	.15 "	Iron	.01 "

All these elements must be supplied in the food. Above all, however, the food must furnish the energy needed to run the living machine, for food is to the body what fuel is to the engine. The energy value of the food is measured in calories, one calorie being the amount of heat energy required to raise 1 liter (about 1 quart) of water 1° Centigrade (1.8° Fahrenheit). Protein and carbohydrate materials each give per gram 4.1 of these heat units, while fat gives 9. The number of calories required by men of different occupations is illustrated in the exhibit by three piles of coal, 12.3 oz. containing 2500 calories for persons of sedentary habits, 1 lb. 2 oz. containing 3500 calories for those of more active labor, and 3 lbs. 4 oz. containing 10,000 calories for a six-day bicycle rider.

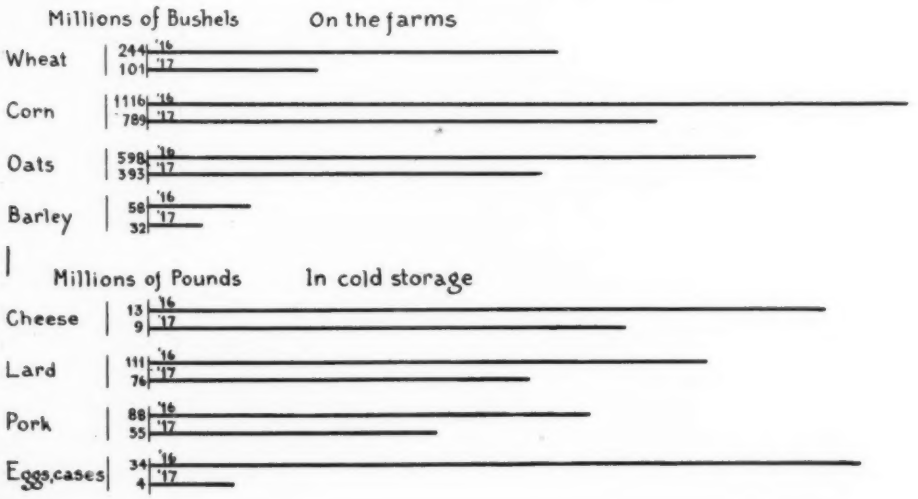
As has been pointed out by Professor Graham Lusk, our greatest need in securing an adequate dietary allowance for the poor is the diffusion of knowledge as to costs and calorie values.

to buy food by the 100 calories rather than by the pound. (The foods shown above, apple pie, lettuce and tomato, asparagus, napoleon, fried eggs, chops and potato, are permanent and accurate wax models made in the preparation shops of the American Museum. See note, page 357)

Demand upon the Food Resources of the United States as indicated by exports for fiscal years ending June 30, 1914, and June 30, 1916



Depletion of the Food Reserve of the United States—Stocks on hand March 1, 1916, and March 1, 1917



We must learn to buy food by the 100 calories rather than by the pound if we are to meet the problem of the dinner table wisely.

Our food exhibit therefore contains as one of its principal features a series of 100-calorie portions of certain common foods so that the meaning of this unit of measure may be clear. Beside each one is shown the composition of the food in question in percentage of protein (the nitrogen-containing and

preëminently tissue-building foodstuffs), of carbohydrate, fat, water, ash or mineral matter, and refuse material, as given in Table A. It will be seen that the 100-calorie portion, corresponding to one large egg, two thirds of a glass of milk, two thin slices of bread, two apples, an ordinary serving of prunes, or a pat of butter, is very convenient for ordinary use in roughly estimating dietary values.

A second series of models (Table B) shows restaurant portions of certain common foods with the calorific value to be obtained from each for five cents on the basis of the studies made in Childs Restaurants in 1915 by Professor Lusk and Mr. F. C. Gephart. It is somewhat interesting to note that desserts such as apple pie and the cake known as a napoleon, which are often eaten merely to tickle the palate after a hearty meal, are themselves among the most concentrated sources of food energy.

The sources of our fundamental food supplies and their relative importance are indicated by maps and diagrams. That "all roads lead to the dinner table" is true in war as well as peace. While the United States is able to furnish most of the staple foodstuffs, it depends upon the rest of the world for accessories, pineapples from Hawaii, olives from Italy, coffee from Brazil, tea from Japan, rice from China, and pepper from Siam. All these contributions appear on our tables so automatically that we scarcely realize their sources. The fundamental food of mankind however is wheat, which, with rye and barley, supplies from thirty-one per cent of the calorific value in the American dietary to sixty-three per cent in that of France, and this fraction as determined by racial habits and instincts is an irreducible minimum which cannot safely be replaced from any other source. It is possible and eminently desirable, however, to spare the wheat supply by the admixture of the alternative cereals

TABLE B

Relative energy value and protein content of 5 cents' worth of restaurant portions as served at Childs, New York

	Calories for 5 cts.	Per cent protein
Cantaloupe	12	8
Tomatoes and lettuce	13	16
Creamed asparagus on toast	49	16
Stewed corn	52	9
Chicken sandwich	78	18
Bean soup	84	18
Creamed chicken on toast	93	20
Strawberry ice cream	102	5
Cup custard	110	17
Egg salad	116	18
Lamb chops	135	13
Fried eggs	166	15
Baked apple and cream	196	1
Baked beans and macaroni	196	18
Crackers and milk	230	12
Cocoa	247	10
Chipped beef on toast	249	16
Apple pie	337	4
Napoleon	454	4

TABLE A

Portions of various uncooked foods which will yield 100 calories, with per cent of various constituents

100-calorie portions	Calories per pound	Protein	Carbohydrate	Fat	Water	Ash	Refuse
10 oysters	43	1.2	.7	.2	16.1	.4	81.4
1½ lbs. lettuce	72	1.0	2.5	.2	80.5	.8	15.0
1 lb. tomatoes	104	.9	3.9	.4	94.3	.5	
⅔ lb. carrots	159	.9	7.4	.2	70.6	.9	20.0
⅘ lb. beans (string)	176	2.1	6.9	.3	83.0	.7	7.0
½ lb. cod	210	11.1		.2	58.5	.8	29.9
2 apples	214	.3	10.8	.3	63.3	.3	25.0
⅓ lb. chicken	289	12.8		1.4	43.7	.7	41.6
1 large potato	302	1.8	14.7	.1	62.6	.8	20.0
⅔ glass milk	314	3.3	5.0	4.0	87.0	.7	
1 dish prune sauce	417	.5	22.3	.1	76.6	.5	
1 large egg	596	11.9		9.3	65.5	.9	11.2
1/10 lb. sirloin beef	960	16.5		16.1	54.0	.9	12.8
2 slices bread	1224	10.9	53.6	1.3	33.2	1.0	
1/15 lb. beans (dried)	1564	22.5	59.6	1.8	12.6	3.5	
1/18 lb. dry oatmeal	1811	16.1	67.5	7.2	7.3	1.9	
6 small lumps sugar	1814		100.0				
1/18 lb. peanuts	1858	19.5	18.5	29.1	6.9	1.5	24.5
1/20 lb. cheese	2080	25.0	1.0	34.0	35.0	5.0	
1 piece butter	3450	1.3		84.0	12.7	2.0	

(barley and rye) as in the preparation of the various kinds of war bread shown in the exhibit.

Our first task as a nation is to see that these minimum needs of the allied countries, and particularly of France, are fully and promptly met. To this end it behooves us to strain every nerve to increase production and—what is of almost equal importance—to diminish needless waste.

It is estimated by Dr. C. F. Langworthy, of the United States Department of Agriculture, that one tenth of all the food that comes into the home is wasted in the kitchen. This totals for the nation an annual loss of $700,000,000. In the exhibit are shown methods of economy that should be practised in the use of left-over meat, fish, and vegetables for hash or soup, sour milk for puddings, and the utilization of dry bread in various ways. At the table smaller portions should be served, so as to prevent food being left on the plates and wasted. In cooking, material saving may be obtained in time and labor by the use of a fireless cooker, of which an inexpensive form, easily constructed in the home, is shown. The purchasing of goods in bulk rather than in package is an important factor in household economy, as are the buying of the cheaper cuts of meat and the substitution for meat as a protein-supplying element in the diet, of such foods as milk, beans, fish, and cheese.

Our diet is largely based on habit. All around is an abundance of potential unutilized foods, which are ours for the using. Along our coasts acres of mussels, tons of seaweed, and bushels of periwinkles go to waste every year. Certain kinds of shark have been found to be delicious, and the United States Bureau of Fisheries is promoting the canning of grayfish. Skate is used at present principally for "scallops," but deserves a wider use. Along the shores of the Hudson wild rice goes unutilized except by the wild ducks. The Indians about the Great Lakes gather wild rice and trade it with the ammunition companies from whom it is purchased by hotels. The wild rice exhibited was cooked in the kitchen of the Waldorf Astoria, New York City. The Chinese make extensive use of the soy bean, easily cultivated in the United States, in the form of sauces, cheeses, and dressings. There are likewise shown, through the courtesy of Dr. Yamei Kin, some preserved duck eggs that are claimed to keep for one hundred years. All of these unutilized foods are shown in the exhibit in Memorial Hall, the specimens of sea foods being contributed by the departments of ichthyology and invertebrate zoölogy of the Museum.

We may learn some things pertinent to the present food crisis even from our predecessors, the native Indian inhabitants of the American continent. The department of anthropology has contributed to the exhibit a series of specimens and models illustrating the skill of the Indians of the Southwest in utilizing the cactus and other local plants as sources of food supply—even making bread out of acorns after extracting their acrid elements by prolonged boiling.

In the past, famine and pestilence have always followed in the wake of war. The danger of epidemic disease has been almost eliminated during the present conflict through the advances in the science of public health. The menace of famine, too, is certain to yield to the application of scientific knowledge as fast as it can be effectively diffused through the medium of public education.

Crô-Magnon Man. After restoration by Professor J. H. McGregor from prehistoric skull found in 1868 in a grotto in the little hamlet of Crô-Magnon, near Les Eyzies, France. *Courtesy of Charles Scribner's Sons*

The Dawn of History

A DRAMA IN THREE ACTS[1]

By T. D. A. COCKERELL

Professor of Zoölogy, University of Colorado

Introduction to Act I.—We commonly divide the human period into the historic and prehistoric. The historic is considered to be that which is recorded in the books,—that concerning which tradition exists, unbroken in the main to the present day. Discoveries of ancient records and writings thus ever tend to press back the date of the beginning of known history, to dispel the mists which hide remote antiquity from us.

There is, however, another way of regarding this matter, and the historic may be separated from the prehistoric without reference to the condition of the records, or even to their existence. There was, strictly speaking, no history as long as man lived in primitive ways, without appreciable progress and without noteworthy deeds. The years rolled by for man as they did for the beasts; as they still do for the wild man of the remoter forests of the Amazon. The ages saw evolutionary progress; but history proper, the marking of time by salient events, did not exist. At long intervals inventions and discoveries did indeed punctuate the centuries, but they were so rare that they produced no connected effect on the human mind, no sense of progress. At length more rapid advance was made, and it was possible in a lifetime to realize that the past and future were not alike, to sense the flow of historic events. The lines below, describing the killing of the first mammoth, attempt to describe the birth of this new age and the new way of regarding human affairs.

[1] Written after reading Professor Henry Fairfield Osborn's *Men of the Old Stone Age.*

Act I. *A cavern in southern France, with group of* CRÔ-MAGNON PEOPLE

ELA. Ah me! Ah me! I fear the worst,
For half the night is spent, and we're alone
And they, and he, all gone to hunt the hairy beast
Which no man yet has slain. They can but fail,
And failing, leave us here alone, to starve and weep,
While in some forest glade their naked bones
Lie bleaching in the sun.

ZUN [*her father*]. You sent them forth,
'twas your desire, you said to them,
"Go kill the hairy mammoth, and bring home
Good meat for all the winter days."

ELA. And if I did, 'twas theirs to know
I was but jesting; need they show
Such zeal to take a woman's word
As a command; as if they heard
The voices of the gods!

ZUN. It *was* no jest—but hist! I hear
A sound upon the breeze. It louder grows, and seems to bring a message of good cheer.
[*Sound of shouting and laughing; and presently a dozen men rush into the cave bearing the tusks, ears and tail of a mammoth.*]

THE MEN. Ah ha! Ah ha! Ah ha! Ah ha!
The mammoth's dead, and we're alive—
save only one!

ELA. Save only one! Come, tell me where is Akak, did he fall
A prey to this mad beast, and you rejoice, while I must weep—
For he was all mine own!

DUK [*leader of band*]. What matters Akak, we have slain
The hairy mammoth, and his meat
Will keep us all the winter days.

ELA. What matters meat when he is gone?
When all I loved is gone, and you I hate!

DUK. Come, hate us not, we did but follow your advice.
The beast, not we, did step on Akak as he fell,
The foremost in the fight. We think the price
A little one for such a victory.

PANCK [*wise man of tribe*]. The stream of life from day to day
Has flowed unheeding on its way.
Who died, who lived, it mattered not,
The winter cold, the summer hot,
Were parts of an appointed plan,
Which never ended, nor began.
Yet now, in midst of ebb and flow
Of human tide, a date is set—
This noble deed, this mighty blow,
Which killed the beast, that we might get
Our meat for winter; this has met
The challenge of the cycles, and today
Historic progress lights our future way.

ZUK [*artist of the tribe*]. Bring chisel, paints, and on the cavern wall
We'll paint the scene, that in the days to be,
As bright fire rays upon the picture fall,
Our sons and their sons' sons may know that we
The mammoth slew, and thus began
A path of progress for the feet of man—
Treading this path, he can but upward go,
His life no longer simple ebb and flow,
While Akak, slain, of all shall longest live,
On lips of men who eager praises give.

Introduction to Act II.—The animals live the lives for which they are fitted; it can scarcely be said that their powers exceed their performance. Man, especially primitive man, is a creature of unfulfilled promises. He is capable of he knows not what; hidden within his mind are powers which may, under other circumstances and in the ripeness of time, transform the world. One of the greatest obstacles to progress and to human happiness in general is the failure to appreciate what is possible; man's inability to realize his own powers. Through long ages the Crô-Magnon man, though endowed with a splendid brain, lived in caves, primitively and with little progress. This condition of things is set forth in verses purporting to represent a discussion among the angels in heaven. They deplore man's low estate, and finally decide to bring him counsel. Thus, perhaps, religion comes into the world; but, as we shall see, it is not altogether intelligent or wise. The angels do not know that man must slowly and with labor tread the upward path, that he cannot be made over all at once. They do not know that progress may not be altogether beneficial, that the changes ahead are full of woe as well as weal; that man, did he know what was coming, might well refuse to leave his Eden and enter upon a sea of troubles. Yet, after all, they represent the future, and through much error and travail man may yet realize his true mission on earth.

Act II. *The halls of Heaven. Three* ANGELS, *representing victory in war, the wealth of cities, and the power of science, talk together*

FIRST ANGEL. The earth is peopled by a noble race of men,
Fair as the gods, endowed with ev'ry gift
To make the world anew, and so to lift
Mankind above the brutes, and set him up
In lordly state to rule the crawling host;
To bend all nature to his will, that he may boast
The world is his, and all the life thereon!

SECOND ANGEL. I saw this wondrous creature in the caves
Of France and Spain, and living such a life
As beasts that hunt their prey, in constant strife
With other beasts, to gain the right to live,
To struggle through this world, content to hold
Enough of this world's goods to shelter from the cold
And keep the flickering flame of life alive.

FIRST ANGEL. 'Tis so, and yet the humble race you saw
Has brains to rise above its low estate,
Has godlike gifts whereby it may create
Houses of wonder, filled with ev'ry gift
Of art and science, helping men to know
The mysteries of nature, ebb and flow
Of life and death, and all that comes thereof.

SECOND ANGEL. The lower beasts do live their lives in full,
But this new creature man is blind indeed,
He knows not what he is, nor can he heed
The promptings of a higher power within.
His godlike gifts mean nothing to him now,
In vain did all the heavenly powers endow
This being with the power to rule the earth.

FIRST ANGEL. Man slowly treads with halting feet the way
To higher things, and as the flowers that blow
In forest glades, from lowly roots must grow
To later loveliness; so given time
This creature man will show his native power,
Will blossom forth in strength as does the flower
And come unto his very own at last!

SECOND ANGEL. For fifty thousand years this man has trod
The same dull path of routine, nor has grown
In intellectual stature; nor has shown
The promise of a better state to come.
What hope remains that he will shortly rend
The crust of ancient custom, and ascend
The throne to which his nature bids him rise?

THIRD ANGEL. Why argue thus about the fate of man
When we have power to set the matter straight,
When we, descending, may point out the gate
To glory, and in glowing words
Describe the gains of progress to the race,
Until, now understanding, he will face
His future in the happy world to be!

FIRST ANGEL. The plan is good, so we may serve
Both gods and men; and as we tell
Blind man to see, that he may dwell
In power through progress, he will spring
Toward the higher goal, and quickly gain
The fruits of human knowledge, and attain
The conquest of the fertile fields of earth!

SECOND ANGEL. We'll hasten forth, and thus will break
The fatal chain of custom and set free
The mind and soul of man, that he may see
The future spread before his raptured gaze.
What joy is his to fully know his power,
What rapture comes to him in this glad hour,
When we descend to serve his utmost need!

[*The three angels descend to earth to convey their message to mankind.*]

Act III. *The cave;* MAMMOTH HUNTERS *and others sleeping* THE ANGELS *appear*

ANGELS. Sleepers, waken, hear our story,
How mankind may come at last
Into power and endless glory
When the ancient night is past.
The light of dawn across the sky
With radiant beams dispels the night;
We bring a message from on high
To put your ignorance to flight!

CAVE MAN. How now, how now, what guests are these
Intruding in our cavern hall,
What mean they by their messages
Of future things that may befall?

FIRST ANGEL. We speak of power, when you shall know
The strength you have to strike a blow.

CAVE MAN. The strength we have, we know it well,
Know *you* the thing that just befell,
How went it with the king of beasts
Who fell before our mighty band;
His flesh we have for winter feasts
Our fame is spread throughout the land.

FIRST ANGEL. One mammoth killed! A little thing
Compared with future deeds of strength
When mighty armies forward fling
Their battle lines throughout the length
And breadth of all the land!

CAVE MAN. To meet a mammoth multitude!
To slay a thousand ev'ry day!
To raise a mountain height of food!
Is this your golden way?
The mammoths do not thus abound
Nor could we use the mighty hoard,
Take note of nature, look around
And see what gains these lands afford!

FIRST ANGEL. Oh, foolish man, I did not mean

A war against the mammoth race;
The greater war, a prize to glean
By those who go the pace!
By those who on their fellows fling
In mighty wrath the sword and spear—
By bloody deeds thus conquering
And filling all the world with fear—
To such the plaudits of the song
And glowing praises shall belong.

CAVE MAN. My wits are dazed, I know not how
The meaning of your tale to read.
Shall wholesale murder us endow,
While all the world shall bleed?
Pray, say to us, where is the gain,
What compensates for all this pain?

FIRST ANGEL. The gain it is to win the world,
To lord it over all the earth,
To see your flag of war unfurled
Wherever men have birth—
And doing this heroic thing
To live as heroes in the fight,
And culture to the nations bring
With heavy hand of might.

CAVE MAN. I see it now, you are possessed
With seven devils in your soul,
You cannot stop, you cannot rest,
While any mind is whole—
The gods above would us destroy,
To make us mad they you employ;
But we discern your evil plan
To make a devil out of man!

SECOND ANGEL. Let me explain another thing:
You love the cave's protecting dome:
Forget the war, and let us bring
The tidings of a better home,
In city streets there shall arise
Vast piles of caverns made by man,
The roofs ascending to the skies:
And all this wondrous plan
Shall crowd into a little space
A million members of your race.

CAVE MAN. We love the forest, and to roam
Here and there from out our home,
We love the wide expanse of land
Surrounding us on either hand;
We love the sunshine and the air,
The woodland sounds and blossoms fair—
What have you in exchange for this?
What hidden good for all our bliss?

SECOND ANGEL. You live but poorly, could you know
The power of wealth, the use of gold;
How some may live, and daily grow
More wealthy, till on growing old
They own the fruits of thousands' toil,
And claim as theirs the very soil,
Which may be bought or sold.

CAVE MAN. Our gains are ours, and hard we strive
To keep the natural man alive,
We know not what you mean by wealth
If it be neither strength nor health.
What gain to any one to own
The earth, though it is his alone?
No man there is among our band
Who would be lord of all the land,
And thrust us forth in dire distress
That he might then the world possess.
Should any wish to do this deed
We should esteem him mad indeed!

SECOND ANGEL. We note your drawings on the wall
Of bison, mammoth, horse and deer;
The work is crude, yet you may call
The Muse of Art, and she will hear,
Will show you how on cloth to paint
Fine pictures you may frame with gold,
To show a sinner as a saint
(That's why the picture's sold).
Your labor will your pockets swell
With cash from those you serve so well.

CAVE MAN. What pockets are we do not know,
Nor do we understand your plan:
But we would ask if you could show
Such canvas images of man
To those in ages yet to be
That they might almost seem to see
The strivings of antiquity?
Our drawings on the wall of stone
Our figurines of bison bone
In days to come will yet survive:
So shall we almost seem alive
And give our message from the past
To those who find them out at last.

THIRD ANGEL. A better story I will tell,
Of Nature conquered by the mind,
Of knowledge that may serve you well
Of secrets you may find
By seeking out the laws that hold
The universe within their sway,
The laws that make the leaf unfold
And send the night to follow day.
So knowing these you may command
The mighty forces of the earth
And from them all in time demand
Whatever is of worth.
Such power is gained in peaceful ways
Nor need to any bring distress;
To science then we give our praise
Who know its power to bless!

CAVE MAN. We know the time the wild birds fly,
We know the bursting of the flowers,
The autumn tints, and when must die
The summer's golden hours.
Such simple knowledge guides our way,
But you would tempt us to aspire
To godly wisdom, such as may
Befit the angels; brave the fire
Of heavenly wrath that mortal man
Has dared to lift the sacred veil
That since the morning time began
Has stood to warn us lest we fail—
For man is heir to man's estate
Nor may he enter Heaven's gate.[1]

[*The angels leave, baffled and perplexed.*]

[1] Man today is midway in the development urged upon him by the Angels of the drama, there is still "the future, and through much error and travail man may yet realize his true mission on earth." Thus the "message" of the drama is clear.—THE EDITOR.

THE SEASON OF WILD FLOWERS

WITH REPRODUCTIONS IN DUOTONE AND SUGGESTIONS REGARDING CERTAIN SPECIES NEEDING PROTECTION

THE BIRD'S-FOOT VIOLET

If only for the sake of the little children of future generations, let us give personal care to the wild flowers of America. They are fast disappearing through reckless picking and uprooting. Possession in the hand is a satisfaction, but if we stop to consider, there is a greater satisfaction. All the beauty of field and woodland, the color, the fragrance, the song of birds, the wind—these are our possessions. We do not need to imprison the wind or kill the bird. We do not need even to own the land on which the sun shines and the flowers bloom. No power can dispossess us in this heritage or remove us from this intimate relation, for by right of the life in ourselves, we are part of the whole.

The bird's-foot violet (*Viola pedata*) grows in sandy places (exposed to full sunshine; compare its leaf with the leaves of shade-loving species) and is the largest of the violet family in America. It has already become extinct in many localities. The common blue violets (*Viola palmata*) may be picked without compunction, for, like the fringed polygala, they produce seeds in the late fall from underground flowers

IN THE HOLLOWS OF THE WOODS

Wild flowers occur always in association, and the associations make their appearance one after another in succession. He who has been much afield, especially when a child, has vivid memories of some of these seasonal associations. In early summer, for instance, when painted cup still flames red from the center of the marsh and wild roses begin to hedge the margin, he expects to catch fragrant whiffs from white elderberry, while he is certain, even if his eyes have lost their sight, that blue flags are somewhere near. He remembers kneeling in the rank grass and fern to gather long-stemmed wild strawberries ripening among sweet white violets and blue-eyed grass. And just beyond, in a boggy spot, how distinctly he remembers the pitcher plants' red umbrellas above cranberry and sundew. Then—memories of the flavor of tender young wintergreen leaves beckon him to the woods, where he used to gather Indian moccasin flowers, and where the strange white Indian pipes push up among the dead, brown leaves of the ground

APRIL DAWN—AND THE WORLD'S FOOD SUPPLY

At dawn each plant begins its daily work of manufacturing starch. We cannot sufficiently glorify plants. Where do we turn in this food crisis of the world war in 1917? To the divine gift in our hands; to the plants of our gardens and the wild plants of the field. And we have no fear but that sufficient will be obtained to feed many millions of people. How is so stupendous a miracle accomplished? As mysterious as the life powers that reside in us is this life power of plants, which we do not possess. They can make starch and proteid out of water and air. We cannot, nor have our wisest chemists been able even to approach a method. But certain unpretentious grasslike plants—we call them corn and wheat—in just one of the states of our Union, have been known to manufacture one to two hundred million bushels of corn and nearly as many of wheat in one short summer. Starch is made up of carbon, hydrogen, and oxygen ($C_6H_{10}O_5$), which elements the plant therefore must have if it is to make starch. Water consists of hydrogen and oxygen (H_2O). Carbon dioxide of the air has carbon united with oxygen (CO_2). The steps in the process are not known but might possibly be as represented in the equation: 5 parts of water ($5H_2O$) + 6 parts of carbon dioxide ($6CO_2$) = 1 part of starch ($C_6H_{10}O_5$) + 6 parts of free oxygen left over ($6O_2$). Whatever the process, the work is done in the living green part of the leaves of plants and only in sunlight. The conversion of this starch into sugar for transportation through the plant, and into proteids (by the addition of nitrogen, etc.) for growth and storage for later growth, makes a fascinating chapter in botanical study

THE GOVERNMENT ALONE CAN SAVE MOUNTAIN LAUREL FOR ALL THE PEOPLE OF AMERICA

Nothing but protection by law will save—at this late day in their destruction—such plants as mountain laurel (*Kalmia latifolia*), rhododendron, pink azalea, and dogwood. They have been made practically extinct within a wide radius of large cities. The first two are now being shipped in carload lots from the mountains of Pennsylvania and the southern Alleghenies. They appear at markets, groceries, fruit stands, and florists, all the year round, and at Christmas are used to decorate churches and hotels. *They should be protected by law* and then artificially propagated for the markets. But not until the free supply from Uncle Sam's garden retreats is cut off, will there be a demand for this artificial propagation.

Imitate the action of the visiting insect by touching the arched stamens (they have their heads buried in small pockets in the corolla), and watch them spring into a reverse position, vigorously throwing their pollen

verse position, vigorously throwing their pollen
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A RELATIVE OF WILD ROSES

Pink meadowsweet flowers (*Spiræa latifolia*) reveal at a glance that they have developed through the ages from the same ancestors as peaches, cherries, blackberries, roses, strawberries, etc. Flower structure shows all stages from flowers in which the parts are separate to marvelous irregularities and complex unions. The plant world is very old, older by many millions of years than ourselves. Flowering plants were blooming and fading, pollinated by the ancestors of our present bees and butterflies, far back in Cretaceous times, when reptiles were the recognized lords of the world. During these ages they have struggled for their existence, and many have become extinct. Those left are the plastic ones that kept the power to vary and adapt themselves to new conditions of climate, to new insect visitors, or to changes in themselves from intercrossing. Some are very complex and different from those they started out with as close relatives, but always there are certain fundamental likenesses to give the clue to their relationship

AMERICAN WILD IRIS

Our marsh flag (*Iris versicolor*), or "fleur-de-lis" ["Fleur-de-Louis," it is the national flower of France and perhaps something besides mere chance has dictated that the cultivated fleur-de-lis should be so popular in America this summer of 1917], is of the "truest blue," and has "a sword for its leaf" —a flower of chivalry.

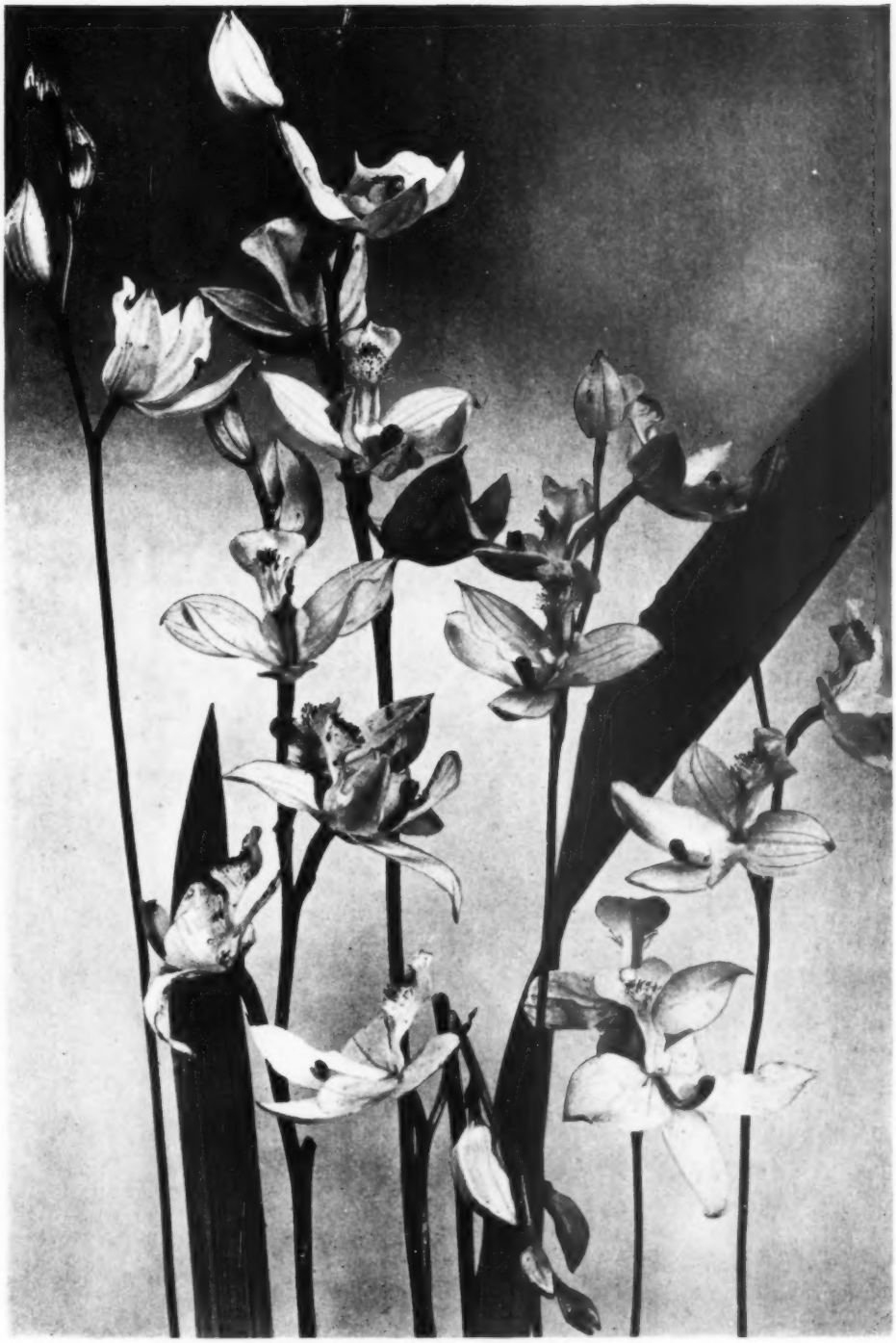
Bees cross-pollinate the blue flag. They are said to be always partial to blue. Self-pollination is prevented both by the position of the parts in the flower and the too early maturity of the pollen. Watch a bee alight on a drooping outer leaf and follow its guiding lines upward and then downward toward the nectar cup, pushing its body under the leaflike roof above, and leaving by the same route. Butterflies reach the nectar with their long "tongues" without entering the chambers where the pollen lies—but there is a bountiful supply, enough for all

THE RARE LARGE PURPLE-FRINGED ORCHID

Flowers and insects—especially bees and butterflies—evolved side by side, and each is dependent on the other. Many wild plants, removed to the garden from woods or marsh, cannot make seeds because of the lack of their insect agents. The orchids advertise their nectar and pollen (for bee-bread for young bees) by color and fragrance. The latter is probably the more potent, for a bee does not see well except when very near the object, but it smells a flower at a great distance and will go unerringly even to a hidden flower, which, moreover, seems but faintly fragrant to us. In the summers of years past, these large fringed orchids have stood erect like purple shadows of the dark tree trunks in the woodland marsh. Today they are too nearly extinct to be seen frequently. Butterflies and moths cannot draw up nectar from the long spurs of the purple-fringed orchid (*Blephariglottis grandiflora*) without transferring the pollen, decorating their eyes and heads with sticky pollen masses again and again

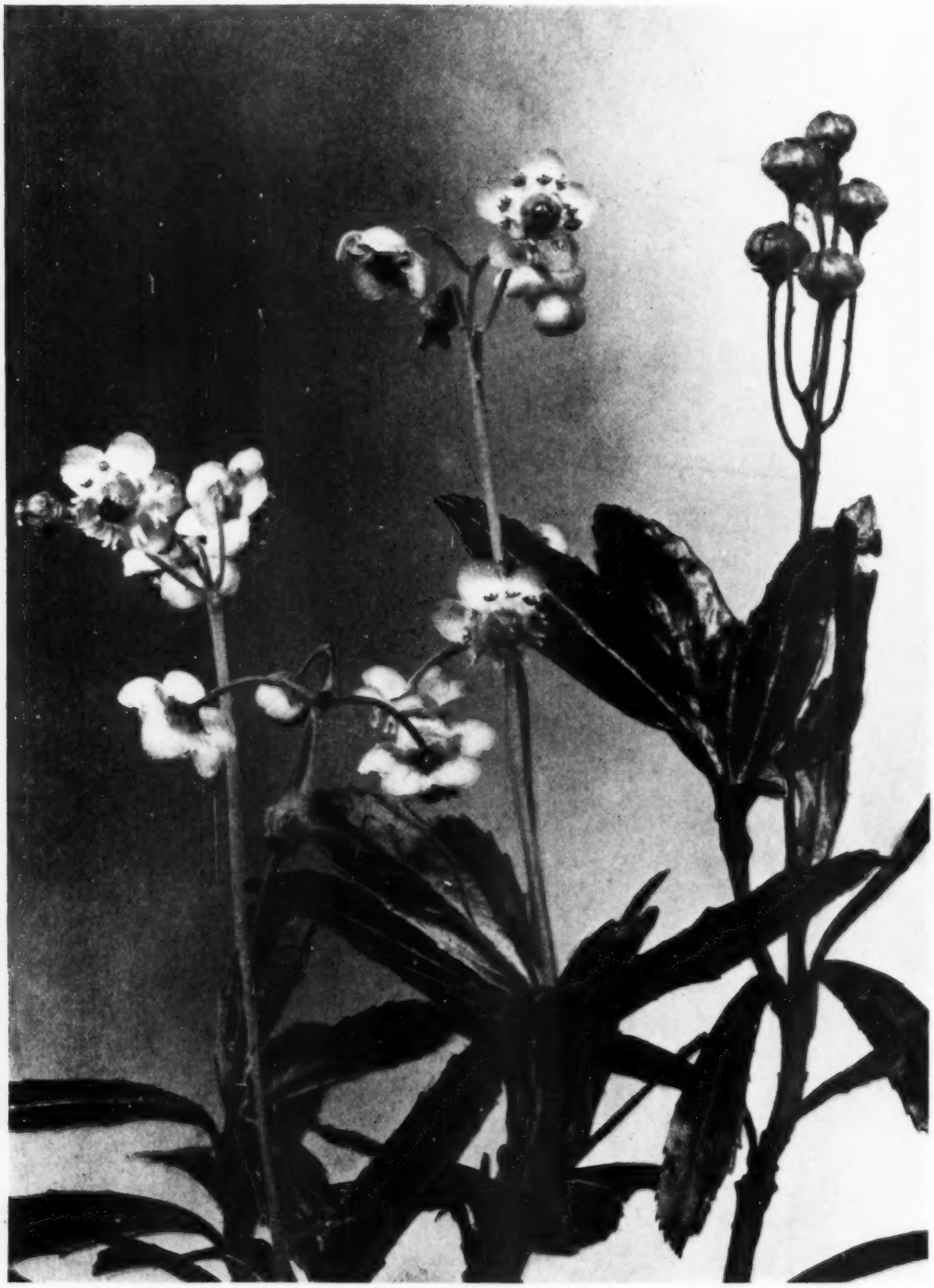
THE SHOWY LADY'S-SLIPPER, WHITE AND ROSE-RED

These fairest of America's wild flowers (*Cypripedium spectabilis*), together with the yellow lady's-slipper, the small fragrant yellow, and the stemless pink moccasin, are certain to be among the first of our wild flowers to become extinct. The showy lady's-slipper may grow in the darkest, most impenetrable part of the tamarack swamp, yet one ruthless hand after another is sure to find it out. The right conditions for this species are found but rarely, growth is very slow, seed-making is not always successful. Such plants should no longer be picked. They should never be used for classroom study in any grade of institution. Some of our native cypripediums might be domesticated. It would be good to study the question of domestication of wild flowers, instituting a system and fashion for "wild flower gardens," with supply stations for plants and seedlings corresponding to our nurseries and hothouses for cultivated plants



GRASS PINKS FROM THE BORDER OF THE MARSH

Where all is motion and life and comradeship, wind swaying the grasses, bobolinks singing, bees flying from flower to flower, grow the rose-purple grass pinks (*Limodorum tuberosum*). They are often accompanied by one or both of two other small orchids, the rose pogonia and arethusa—all three too easily uprooted from the moss. Each grass pink flower has a cup of pollen with a hidden hinge which the bee swings open. The species seems to be an isolated record of a previous and more simple state of the orchid family, where the lip was above in the flower and the seed pod not twisted; if it is this, all intermediate forms have become extinct. These beautiful small orchids should be eliminated from all lists of supply for botanical study in schools



SYMBOLIC OF THE QUIET OF SUMMER WOODS

Small "wild flower reservations" should be set apart by the government in the haunts of the choicest species, and laws against picking wild flowers should operate in all parks and forest and game reservations. The delicate waxy pipsissewa, or prince's pine (*Chimaphila umbellata*), is typical of the low, woods flower which children pick by the handful thoughtlessly and scatter withered along the way home. If schools will but emphasize the really important things in botany, boy and girl scouts and all children will enforce protection of rare wild flowers

WELL WORTHY OF CULTIVATION

The groundnut (*Apios tuberosa*) is a climbing annual vine having maroon and lilac flowers of velvet texture and with the fragrance of the English violet. The groundnut (it has an edible potato-like tuber) belongs to the pea family—a family of unusual interest because of its fodder value in clovers and alfalfas, and food value in beans and peas, seeds in which starch, sugar, and proteids (manufactured by the plant) have been stored in such stable form that they can be shipped to all quarters of the globe. Members of the pea family have the wonderful power of collecting nitrogen from the air of the soil. The work is done by millions of bacteria which live in minute protuberances on the roots. Farmers are learning to enrich the soil by growing clover or cowpeas and ploughing the crops under, or they alternate various crops with some member of the pea family; also they increase their clover, bean, or pea crop tenfold or more by wetting the seeds before planting with a culture of the bacteria

FERNS BY THE COUNTRY ROADSIDE

The interrupted or Clayton's fern (*Osmunda claytoniana*) attains a wonderful growth in June, having come up slowly in picturesque colonies, while anemones, jacks, and trilliums were blooming. It has never been estimated how much water such a fern bed evaporates into the air—evidence of the starch manufacture going on; probably many thousand gallons in a summer. (A single oak tree is said to evaporate 130 tons during its growing season.) The water current pushes up from the roots faster than it can be used in the leaf, and the excess is given off as vapor. Ferns were the first plants in the history of life on the earth to develop a division of labor among the cells of the stem, setting apart a system of vessels especially to carry sap. The walls of these vessels are "wood," which, as such, makes the plant strong to stand erect, even to rise into tall trees, as in the tree ferns of the tropics

IN SUMMER WHEN DAYS ARE LONG AND WARM

Look over any list of American flowers needing protection; not one is in the aster family (*Compositæ*). Scan a list of our food and fodder plants; very few indeed are members of the aster family—lettuce, oyster plant, artichoke, chicory. Yet the aster family has some twelve thousand species, more than one tenth of all flowering plants. It is the highest family considered from the standpoint of evolution, the youngest, a hardy, highly adaptable race, outcome of the plant world's past ages of struggle. The individual flowers are always united into communities with a division of labor among them; there are the most effective arrangements and movements for cross-pollination with always the possibility of self-pollination as a last resort; their seeds seem infinite in number. That the family is dominant and successful in winning its way against odds can be judged by the fact that its members completely cover the country. They are not rare and few and hidden away in impenetrable swamps. Instead, millions strong they flaunt their beauty even under the eye of their greatest enemy, man, the agriculturist

FLOWERS OF THE CHESTNUT TREE

They are unendurably sweet, but beautiful to the eye, drooping above the leaves instead of underneath as among the oaks. The trees (*Castanea dentata*) bloom in July (Massachusetts) and the nuts (note the five or six young burs toward the upper part of the branch) do not ripen until late fall; they are prisoners on the trees until November frosts open the burs—unless perchance some foresighted squirrel bite off the branches a few weeks earlier. Botanists have scarcely begun what is possible in nut tree breeding from the standpoint of food production. Experiment, however, has already obtained, by grafting the chestnut of Japan upon our native chinquapin (which though small is very sweet), an extremely prolific chestnut with all the requirements for commercial handling—and immune to the chestnut blight. The secret to remember is that nut trees are living individuals, no two being alike in rate of growth, tendencies regarding time and amount in fruiting, and size and flavor of nuts, and that a wise selection, with grafting, is certain to revolutionize our ideas as to what can be expected of a nut tree

FLOWERS IN PREPARATION FOR BEECHNUTS

Beechnuts, though most delicious, are small and seldom marketed in this country. Some day the woods will be explored for the beech trees (*Fagus americana*) with superior nuts (they vary greatly in size) for special propagation. The beechnut has rich food and mast values, while yielding a high grade of oil. With the increasingly high cost of meat, we are importing more nuts. American nut culture should be looked into. There is no reason why a tree cannot be grown for many annual harvests of nuts and a final harvest of wood also, making a farmer's wood lot or even a steep hillside as valuable as the best agricultural land. If a hickory with poor nuts be cut for lumber, graft on the best shagbark. Transplant young nut trees (hickory, walnut, chestnut, etc.), and graft on the finest of their kind. Then multiply this crop by planting an understory (keeping it cut low) of locust, or annual crops of cowpeas—in either case a member of the pea family to gather nitrogen and share it with the nut trees. Nut culture in America will undoubtedly receive a strong impetus as one of the results of the food crisis and war of 1917

MIDSUMMER ALONG A NEW ENGLAND RIVER

In field work let us replace the collecting can and our old desire for possession with notebook, sketchbook, and camera—especially with "detective work" to see what plants are doing. How do they overcome mechanical obstacles in their way, how attract and receive insects, how scatter seeds? How do they vary in shade and sun, with what other plants are they struggling for space, into what communities are they organized? What are the most striking examples of plants in process of migration, marching year by year toward the center of pond or moor, filling up hollows, making soil in rocky places—everywhere slowly changing the face of the earth? What are some of the wild flowers especially endangered by man's drainage of swamp land, removal of forests, and cultivation of new land? Man has "dominion over all the earth." Think what we shall do with that dominion

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Weird Diseases of Africa

THE STORY OF STRANGE PARASITES WHICH TRAVEL FROM MAN TO MAN THROUGH THE AGENCY OF TSETSE FLY, MOSQUITO, OR OTHER "INTERMEDIATE HOST"

By WALTER B. JAMES

President of the New York Academy of Medicine

FROM earliest times the "Dark Continent" has been known as the home of peculiar men and beasts. Modern science, especially medical science, now teaches us that the minute, even microscopic, life of Africa is no less individual and remarkable, especially its parasitic life, while the symptoms these parasites produce in the unfortunate human beings infested by them are equally weird and generally extraordinarily unpleasant. Many of the diseases produced by these microscopic parasites have been known to physicians—at least as far as their symptoms were concerned—for many years, but only lately have the wider settlement of Africa and the progress of medical science, with the establishment of schools of tropical medicine like those at Liverpool and Harvard University, made the nature of these important diseases clear to us.

In the slavery days in America it was noticed that often in a shipload of slaves who had been captured in the interior of Africa and sent here, a large number would sicken in a peculiar way and then die. They first became dull and listless, then so drowsy that they could be roused only with great difficulty. They refused to eat and then died. Other and subtler symptoms were overlooked. It was natural that illness and death should be ascribed to homesickness. These people, we now realize, had the "sleeping sickness." In their jungle homes they had been bitten by the tsetse flies that had previously bitten persons, or perhaps animals, having this disease, and had conveyed the parasite in this way. For the germ—a worm, not a bacterium—inhabits the blood of its victim, and multiplies there.[1]

When the blood containing them is taken into the stomach of the fly, the germs multiply there (the fly acting as the intermediate host between the two human beings) and go through a phase in their lives that may be likened—to use a comparison familiar to us all—to one of the stages in the life of a butterfly. The progeny find their way to the salivary glands of the fly and lie there, ready to be injected into the blood of the next person to whom the tsetse turns for a meal. If we take a drop of blood from the finger of a person who is in the advanced stage of sleeping sickness, and put it under a powerful microscope, a remarkable situation is evident. Enormous numbers of the parasites (trypanosomes) are seen rushing about, apparently aimlessly, knocking the blood corpuscles about like so many ninepins, and one wonders that a man could live at all with such weird things going on in his blood.

Whole tribes of blacks in Africa have been annihilated by this disease and, as one of the methods of controlling it, it has been suggested that in the parts of Africa most affected, the wild game should be killed off, for it has been shown that animals, too, may be hosts for such parasites and thus help to preserve them. The laws that secure the perpetuation of these minute enemies of man are just as effective as the corresponding laws that seem to us to work for our benefit. Nature is impartial. To be sure she has given us an intelli-

[1] This parasite is the *Trypanosoma gambiense*, and is generally called the trypanosome of sleeping sickness. Such a parasite generally has to live in two different kinds of animals in order to round out its complete life, and for each variety of parasite the two hosts are always the same. One is called the "intermediate host," the other, the "final host." In the case of the trypanosome of sleeping sickness, the tsetse fly is the intermediate host, man (or in some cases the antelope) the final host.

gence that leads us, or ought to lead us, to the use of microscopes, laboratories, and through these to a successful combat with disease; but as an offset to this, she has, as a rule, made us more susceptible to disease than are the lower animals. As far as we know the antelope with trypanosomes in the blood is not made ill by them. The killing of the vast herds of buffalo that once ranged our own western prairies was necessary in order that these lands might support great herds of cattle; and so perhaps when the Dark Continent comes to be settled, it may be necessary to kill most or all of the wild game animals in order to eliminate this terrible disease.

One of the most peculiar of all tropical diseases, and one that is very common in some parts of Africa, is filariasis, caused by a parasite called the filaria. In the blood of persons suffering from it there are found innumerable little worms that can be seen only by the aid of a microscope. These are present only at night in the blood that is circulating. At about five o'clock in the afternoon they begin to appear in the blood, having been hidden away in the body until this time, and they remain in the circulation until about midnight when they begin to diminish. By eight or nine o'clock in the morning they have all disappeared, and a search of the blood under the microscope after this fails to reveal any. They are now collected in certain large blood vessels deep in the body, especially in the lungs, where they remain hidden until they go out on their next nocturnal excursion.

The parasite is conveyed to human beings by the bite of certain kinds of mosquitoes. The mosquito bites, and takes from a man (or from some animal as the case may be) blood which contains these small worms. In the stomach of the mosquito (the intermediate host) the parasite goes through certain definite changes or metamorphoses which are just as necessary to its complete life as are the different phases in the lives of butterflies, moths, and a great many insects. First it escapes from a skin or shell in which it has existed. Then it bores its way through the wall of the mosquito's stomach, and travels forward through the body until it arrives at the base of the bill or proboscis. Here it curls itself up and waits until its host begins to feed upon a warm-blooded animal, when it passes out and finds its way into the circulation of the animal. These filariæ behave in a curious way which has the same effect as though dictated by intelligence: that is, when the mosquito, in the absence of animal food, feeds upon fruit, such as bananas, the filaria does not leave its comfortable berth but continues to wait until it has the chance to enter the circulation of a warm-blooded animal. A possible explanation of this, however, is that when a mosquito bites a human being, it first injects a small amount of fluid secreted in its salivary gland. This fluid prevents the blood from coagulating and stopping up the very small bill through which it is drawn. This poisonous substance is the cause of the swelling and itching that follow mosquito bites. It is not known but that the filaria is injected along with this, for it is fair to assume that the insect would not need to inject the secretion when feeding on bananas, as banana juice does not coagulate.

When the parasites find themselves injected into the blood of a man, the "final host," they travel about in the circulation until they find a resting place in one of the larger main lymph vessels, and here they settle down for the rest of their lives, one or more males and one or more females coiled up together. From this point they send out into the blood current every evening innumerable broods of young which are the ones that rest by day and circulate by night; and so the life cycle is run, over and over again. Their nocturnal activity is supposed to be related to the fact that their intermediate hosts, the mosquitoes, carry on their predatory excursions after dark, and therefore it would be of no avail for the little parasites to get into the circulation in the daytime. This is an evidence of Nature's thought for the preservation of a species that, from our point of view, is useless.

When the parent worms have selected a large lymph vessel at the base of a leg or an arm, for instance, and have started in raising a large family, we find that in entire disregard of the comfort of their host, they have soon completely blocked up the vessel, and so produced a slow chronic congestion of the whole limb below. The limb then becomes of enormous size, and from its supposed likeness to the shapeless leg of an elephant, the disease is now called "elephantiasis." When we travel in the tropics, especially in Africa, and see—as one often does—a person with enormous enlargement of one arm and hand or one leg and foot, we may be quite sure that it is a case of filariasis, and that there is a colony, as above described, living in the armpit or groin. These cases occur also in other countries, indeed in almost every tropical and subtropical land into which the disease is introduced through travel. It, like malaria, is to be prevented only by getting rid of mosquitoes, the intermediate host.

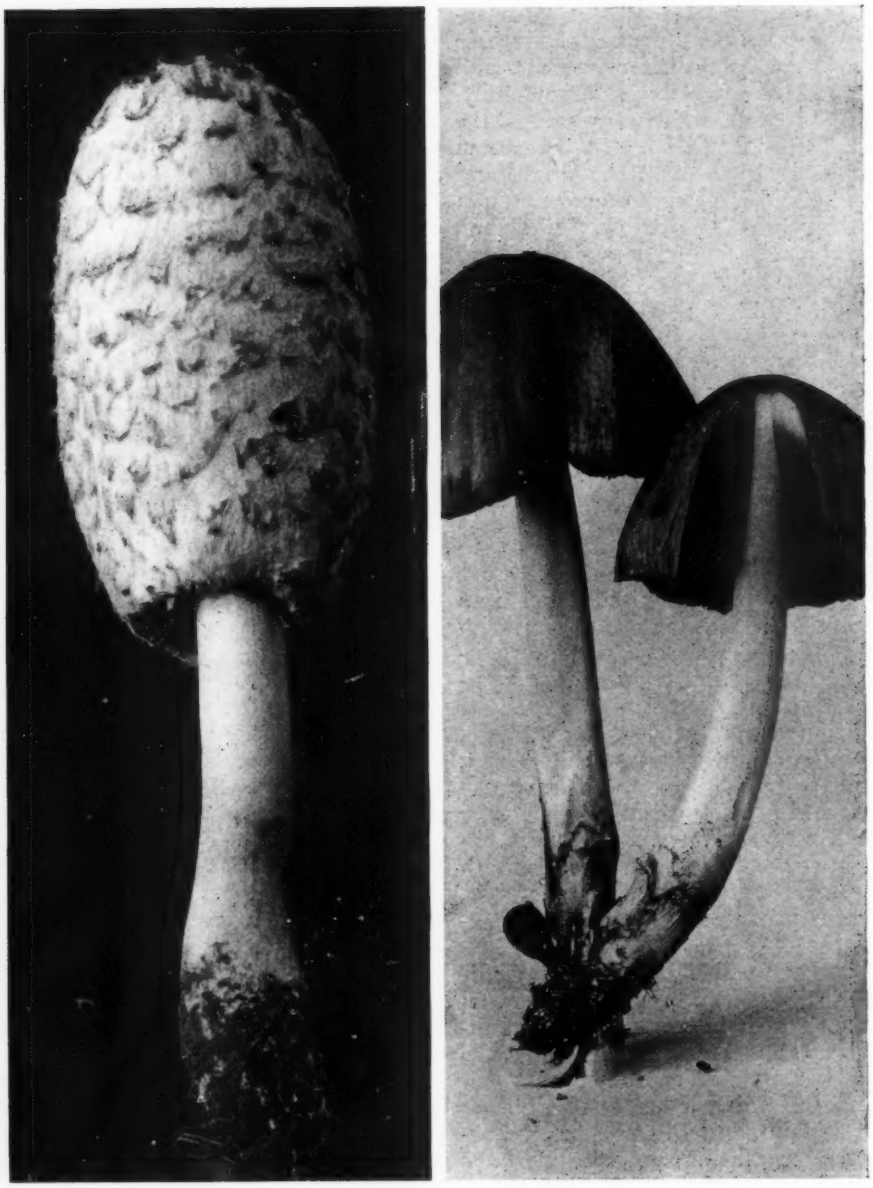
There is another species of filaria, the *Filaria loa,* very common in Africa, which is transmitted to man by the mangrove fly, a common blood-sucking insect in that country. This worm settles in some of the tissues just beneath the skin, often in the lower eyelids, where it produces uncomfortable swellings.

Another peculiar African parasite is the guinea worm. This, too, has an interesting life history. Little or nothing is known of the male worm, but the female, very slender in diameter although attaining a length of three or four feet in adult life, is found immediately beneath the skin usually of the lower limbs. It has probably been fertilized before entering, and, lying immediately under the skin of its host, when fully grown it pierces this skin and through the minute aperture extrudes countless minute young or larvæ, in successive crops.

By this time it has caused much irritation and suffering and perhaps disability to the host. The larvæ find their way into the water as the natives walk through streams and puddles. In the water they are taken up by a minute aquatic creature called *Cyclops,* which becomes the intermediate host, and within its body they go through one of their life phases.

The *Cyclops* later is taken into the human being's stomach in the drinking water, where it perishes and its minute body is dissolved in the gastric juice. This sets free in the native's stomach the contained living larvæ, one or more of which may then succeed in boring through the stomach wall into the body tissues. Now an imperative instinct urges the developing worm to find its way through the body toward the skin in order that it may place its numerous young on the surface, as in this way only can they find the *Cyclops,* necessary to the completion of their life cycle. For this reason, too, apparently, the female worm seeks the native's lower limbs, for these come most in contact with puddles of water, and it is in puddle water that the *Cyclops* especially abounds. In India, water carriers bearing skins of water on their backs are subject to guinea worm of the skin of the back, for in them the parasite's instinct leads it to seek this part of the body.

In all of these organisms and their behavior we see Nature's wonderful methods for the continuation of life of even the lowest species. Design, and successful design, is just as surely seen in the lives of the trypanosomes, the filariæ, and the guinea worm as in the wonderful strength of the elephant, the tough hide of the rhinoceros, or the fleetness of the antelope and the ostrich. We realize that we are not Nature's chosen children but must take our chances with the rest of life; that Nature cares just as much for the parasites that plague us as she does for us who are plagued by them; that she looks to us to take care of ourselves with the weapons she has put into our hands or else perish and make way for others who use her gifts to better purpose. It behooves us, therefore, to use our intellects, our only real weapon in the fight against disease, and to turn for aid to science, which offers us the only hope of victory.



SHAGGY-MANE AND INK-CAP

If we knew more about the many edible varieties of mushrooms, which now rank among our table luxuries, they could be made a valuable addition to our food supply. In protein value mushrooms rank about the same as the potato.

These two familiar examples are common in the rich soil of lawns and elsewhere in late summer and autumn, ink-cap (*Coprinus atramentarius*) being the more abundant. Shaggy-mane (*Coprinus comatus*), which is considered one of the very best and most digestible of the mushrooms, is conspicuous on account of its shape and its striking pinkish, reddish, and purplish tints, all often seen at the same time on one plant. Ink-cap is less attractive in appearance, and is more available for catsup than for other food purposes

Wild Mushrooms as Food[1]

By WILLIAM A. MURRILL

Assistant Director of the New York Botanical Garden

THE immense importance of the food question at the present time naturally suggests the use of wild foods; and many of the wild mushrooms might be made a valuable addition to our food supply if the public knew enough about them. Fresh specimens are available throughout the summer and autumn, and the surplus might be canned or dried for winter use.

The popular and widespread interest in mushrooms of all kinds is almost phenomenal. This is due to their beauty of form and color and the supposed mystery surrounding their origin and growth, as well as to the use of certain kinds for food. Their nutritive value is not very great, being about equal to that of cabbage, but they afford variety in flavor and add greatly to the relish for other foods.

Mushroom eating is much more common in Europe than in America. The struggle for existence is greater there, and the edible and poisonous varieties are better known by all classes of people. In China it is almost impossible for a botanist to get specimens on account of the thorough manner in which all wild food is collected by the natives. The use of mushrooms in this country is confined chiefly to our foreign-born population. Even in New York City, many excellent kinds go to waste every season because they are different from kinds known in Europe.

All knowledge regarding the edible and poisonous properties of mushrooms is based on experiments, either intentional or unintentional. The only safe rule is to confine oneself to known edible forms until others are proved harmless. If one is a beginner, he is like an explorer in a new country with an abundance of attractive fruit near at hand, which may be good or may be rank poison.

Any writer on this subject undertakes a very responsible task, owing to the vast number of similar forms among the mushrooms which are distinguished with difficulty by those not accustomed to fine distinctions; but it should be possible with the aid of figures to describe a few striking kinds in such a way that no serious mistakes will be made.

Pale Yellow Coral Mushroom.—**Bushy, seven to fifteen centimeters high, five to ten centimeters wide; base thick, fleshy, white, dividing abruptly into a dense mass of erect, pale yellow branches, the tips more deeply colored but fading with age; flesh white, mild, of good flavor.**

This excellent, as well as beautiful, coral mushroom occurs rather abundantly in woods during warm, wet weather. In collecting it, the base should be examined for insects, which might give a disagreeable flavor to the whole plant.[2]

The coral mushrooms are easily known by their striking resemblance to clusters of branched coral. They grow on the ground or on rotten wood in dense shade, and are usually whitish or yellowish in color. When tender and of mild flavor, they make a delicious dish. None of them are known to be poison-

[2] The golden *Clavaria* is similar, but more deeply colored. The rarer red-tipped *Clavaria* has red-tipped branches, the color of which fades out with age. There is also an unbranched, club-shaped species which is often eaten.

[1] Illustrations from photographs by the Author

FOODS ATTRACTIVE TO THE EYE AND DELICIOUS IN FLAVOR

Pale yellow coral mushroom (*Clavaria flava*).—This beautiful variety, which occurs rather plentifully in woods during warm wet weather, is easily known by its striking resemblance to branched coral. The flesh is white and the taste agreeable

Edible *Boletus* (*Ceriomyces crassus*).—The large reddish brown cap of this well-known mushroom may be seen in July and August in woods, and at the borders of woods, and sometimes in open waste places. It has a pleasant nutty flavor even when raw

Fairy-ring mushroom (*Marasmius oreades*).—Easily recognized by its habit of growing in circles. When young and moist it is yellowish red in color, becoming paler with age

ous, although a few are insipid or bitter. Coral mushrooms may be cooked as other mushrooms are, or escalloped, or stewed slowly for half an hour with the usual seasoning and a little lemon juice, then thickened and cooked longer until tender.

Edible Boletus.—Convex, six to twenty centimeters broad, three to four centimeters thick; surface smooth, varying in color from ochraceous brown to reddish brown, sometimes paler; flesh compact, two to three centimeters thick, unchanging, white or yellowish, taste sweet and nutty; tubes white and stuffed when young, yellow or greenish yellow when mature, changing to greenish ochraceous when wounded, about two centimeters long; stem stout, becoming bluish or discolored when wounded, wholly or partially reticulate, solid, yellowish within, five to ten centimeters long, three to four centimeters thick.

This excellent species of *Boletus* is abundant, well-known, and widely distributed in thin woods throughout temperate regions. The cap is large and usually yellowish brown, while the stem is more or less reticulate, especially above. In one variety, the stem is reticulate to the base, and in another the stem, as well as the cap, is brownish lilac in color. It may be distinguished from the bitter *Boletus* by its mild flavor and differently colored tubes. This species is much used in Europe, and is often sliced and dried for winter use. Large quantities are shipped to this country from Russia and elsewhere. It is best baked in a covered dish for an hour, after removing the tubes and stem and cutting it into small pieces.

Fairy-ring Mushroom.—Convex to expanded, slightly striate at times when moist, fleshy-tough, drying easily, two to five centimeters broad; surface buff or tawny, fading with age or on drying; flesh thin, white, of pleasant odor and taste; gills yellowish white; spores white; stem slender, tough, yellowish white, villose-tomentose, five to eight centimeters long, two to four millimeters thick.

The very excellent little fairy-ring mushroom is to be looked for in pastures during spells of wet weather in late summer or autumn. Its habit of growing in circles will aid one in recognizing it. It should be cooked for some time, owing to its tough texture.[1]

Oyster Mushroom.—Convex or nearly plane, irregularly fan-shaped, clustered, five to twelve centimeters broad; surface smooth, variously colored, usually white, yellowish, or brownish; flesh white, mild-flavored, somewhat tough; gills white; spores white tinged with lilac when shed on paper; stem eccentric or lateral, short or wanting, varying according to position in the cluster, strigose-hairy at the base.

The oyster mushroom is very common on dead trunks of deciduous trees, especially elm, from June to November. In Hungary, it is cultivated on sections of elm logs. The sapid mushroom is confused with it in this country and for our present purpose need not be distinguished, as its properties are similar. Both species are rather tough and lack flavor, but they occur in such large masses and are so readily recognized that they are to be recommended for general use as food. The young and tender caps should be selected and cooked slowly in a saucepan for at least twenty minutes.

"Masked" Tricholoma.—Thick, firm, convex to expanded, five to twelve centimeters broad; surface moist, lilac or purple, fading to grayish, becoming slightly brownish on the disk; margin inrolled and frosted when young; flesh white, firm, pleasant to the taste, becoming dull-colored with age; spores dingy white, dull pinkish in mass; stem short, solid, often bulbous at the base, lilac or violet, three to six centimeters long, one and one half to three centimeters thick.

The "masked" *Tricholoma* is exceedingly valuable, of excellent flavor, and not easily confused with dangerous species. It may be found in open woods or among weeds or long grass in rich fields during the autumn months.

[1] One should be very careful in picking small fungi growing on lawns for table use, to avoid getting *Inocybe infida*, a dangerous species with yellowish brown spores; and certain species of *Panæolus*, having black spores.

THREE WILD FOODS FOR THE TABLE IN SUMMER AND FALL

Oyster mushroom (*Crepidopus ostreatus*).—So named on account of color and shape, rather than for its flavor. It is common on dead tree trunks, especially of the elm, but does not rank as a mushroom of first quality on account of its toughness

"Masked" *Tricholoma* (*Lepista personata*).—This large, lilac-tinted mushroom is of excellent flavor and not easily confused with dangerous species

"Perplexing" *Hypholoma* (*Hypholoma perplexum*).—The striking reddish clusters of this variety appear on stumps and roots of deciduous trees in autumn. Although the quality is inferior to some it is useful on account of its late appearance

Its large size and the violet or lilac tint of all its parts should distinguish it from most other species. In large, mature specimens, the flesh becomes soft and readily absorbs water during wet weather, which somewhat changes the appearance of the mushroom and lessens its value for edible purposes.

"Perplexing" Hypholoma.—**Convex to nearly plane, clustered, five to eight centimeters broad; surface smooth, dry, brick-colored to bay, the margin cream-colored to ochraceous; flesh usually of mild flavor, sometimes bitter, white or nearly so, becoming yellowish with age; gills sometimes slightly greenish, and finally purplish brown; stem straw-colored above, ochraceous or reddish below, six to ten centimeters long, five to seven millimeters thick.**

The "perplexing" *Hypholoma* occurs abundantly on stumps and roots of deciduous trees in autumn, appearing in conspicuous reddish clusters of considerable size. It is edible, but not very good in quality, being useful because of its late appearance. In collecting this species for food, young and fresh specimens of mild flavor should be selected, and they should be cooked for at least thirty minutes. Soaking in water with a little vinegar for twenty minutes before cooking improves the flavor.

Common Mushroom.—**Convex to expanded, five to nine centimeters broad; surface dry, silky, and whitish, or floccose-squamulose and light reddish brown, the color being chiefly in the scales; flesh white, thick, solid, of mild flavor, sometimes becoming reddish when broken; gills white when young, becoming salmon-pink, and finally brown or blackish; spores dark brown; ring delicate, inconspicuous, formed from a thin, white veil, which covers the gills in their younger stages; stem smooth, white, three to six centimeters long, one and one half to two centimeters thick.**

The common mushroom occurs in low grass in meadows or on rich, moist, upland pastures, being common after rains from August to October in this latitude. The "spawn," or vegetative portion, is hidden in the soil and feeds upon the dead organic matter found therein. In the cultivation of this species, bricks of spawn are planted in suitable soil and the conditions of growth attended to with great care.[1] This is the mushroom usually found in market, either in the fresh stage or in cans. Most persons who collect fungi for food in the fields limit themselves to this one species. Great care must be taken not to get young plants of the deadly amanita when collecting "buttons" of the common mushroom at the edge of woodlands. Also beware of the poisonous *Panæolus* which may appear in mushroom beds.

Common Ink-cap.—**Ovoid to bell-shaped, finally expanding and deliquescing, densely clustered, three to six centimeters broad; surface smooth or slightly scaly, especially on the disk, grayish or brownish, often with a yellowish tint, blackening with age; flesh white, quickly deliquescing; gills white when young, soon becoming black and dissolving; spores black; stem slender, smooth, white, five to ten centimeters long.**

The common ink-cap is an excellent edible species and is quite common in rich soil on lawns and elsewhere during late summer and autumn. As it appears in close clusters, it may usually be obtained in greater abundance than the shaggy-mane. Owing to its deliquescent character, it must be cooked very soon after it is collected.

Shaggy-mane.—**At first oblong, expanding and deliquescing with age, four to six centimeters in diameter; surface shaggy, white, with yellowish or brownish scales, tinged with lilac in places, grayish black on the margin, blackening with age; flesh white, tender, of nutty flavor; gills white when young, soon changing to pink, then to black, and finally melting away into an inky fluid; spores black; ring white, small, movable or slightly adhering, often falling away at an early stage; stem slender, smooth, white, seven to twelve centimeters long.**

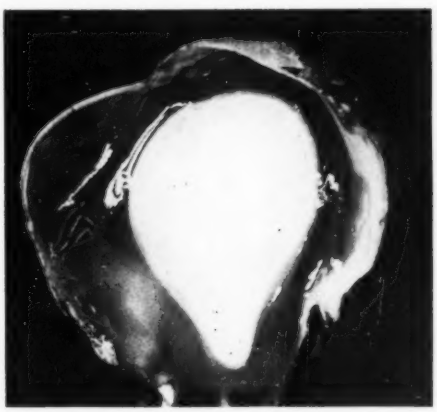
The shaggy-mane is a very conspicuous object on lawns in autumn, although it is not always so abundant as

[1] **The United States Department of Agriculture at Washington, D. C., will gladly furnish information regarding the cultivation of mushrooms in cellars during the winter months.**

From midsummer to October, the common mushroom (*Agaricus campester*) may be seen springing up everywhere among the low grass in meadows or on rich, moist, upland pastures. This is the mushroom usually on the market, fresh or in cans. In collecting it at the edge of the woodlands great care must be taken not to get young plants of the deadly amanita

Common pasture puffball (*Lycoperdon cyathiforme*).—Although this puffball occurs commonly in the eastern United States in meadows and pastures, its excellent food qualities are little known. Puffballs are the safest of all fungi for the beginner and are easy to obtain. Being tender, they cook quickly and are easily digested. (See also figure on opposite page)

might be desired. On account of its peculiar shape and decided colors, a single specimen rarely fails to attract attention. It is considered one of the very best and most digestible of the fungi, and is often eaten raw by foreigners. At times, this species occurs in enormous quantities in rich, loose earth by roadsides or in weedy places, and it then becomes an important source of food supply. It requires little cooking, and is best broiled and seasoned simply.



The "egg" of the poisonous stinkhorn mushroom (*Dictyophora duplicata*) in section, showing how it differs from a puffball. The stem and a green mass inside are surrounded by a layer of jelly-like substance, while the puffball in section is smooth and solid

Common Pasture Puffball.—**Large, rounded, five to fifteen centimeters in diameter, the base short and thick; surface smooth, whitish gray or brown, becoming purplish with age; spores purplish brown.**

This puffball occurs commonly in the eastern United States in meadows and pastures where the common mushroom may be expected to grow, but its excellent qualities appear to be unknown to most persons. It is the largest puffball in this region except the giant puffball, which is much rarer. It sometimes grows in circles, and it has been known to be so abundant as to injure lawns seriously.

The giant puffball may be readily recognized by its large size, usually about the size of a man's head, and its smooth, white appearance. It occurs infrequently in fields, pastures, or woods throughout most of the United States.

Puffballs are the safest of all fungi for the beginner, none of them being poisonous; and they are at the same time excellent and easy to obtain. Being tender, they cook quickly and are easily digested. They should as a rule be cut open before cooking to see that they are not too old and that they are really puffballs. If they are white and firm like cream cheese inside, showing no yellow or brownish discoloration, they are of the right age to use. If the interior shows no special structures, but is smooth and homogeneous, then one may be sure he has a puffball. The "egg" of the deadly amanita contains the young cap and stem inside, which are readily seen when the "egg" is cut; and the "egg" of the stinkhorn shows the stem and a green mass inside surrounded by a layer of jelly-like substance.

Puffballs may be cooked alone in various ways, or used in stews and omelets, and for stuffing roast fowls. When used in omelets, they should be stewed first. All kinds except the very small one should first be peeled and cut into slices or cubes, after which they may be fried quickly in butter, or dipped in beaten egg and fried like egg-plant, or cooked in any of the ways recommended for the ordinary mushroom. The smaller kinds are much inferior in flavor to the larger ones and need a few specimens of some good mushroom to make them attractive.

DEADLY AMANITA, THE CAUSE OF MOST CASES OF MUSHROOM POISONING

This mushroom (*Venenarius phalloides*) is the most dangerous of all fungi, and to it most cases of mushroom poisoning may be attributed. White, yellow, brown, and green forms may be found growing in woods, groves, open places, and bushy pastures, from July to October. It may easily be distinguished from the common mushroom, however, by the fact that the radiating gills underneath the cap are persistently *white*, those of the common mushroom being pink. The right-hand picture shows the cap bursting from the "egg" and the formation of the so-called "death cup." The veil still covers the young gills but will fall to the stem later, to form the "ring" which is shown in the other figure

FLY AMANITA, OR FLY POISON

A showy and attractive plant, the fly amanita (*Venenarius muscarius*) is our most common poisonous species of mushroom. The color is bright red, scarlet, or orange in the young plant, fading to yellow on the margin in the mature specimen, while the cap is adorned with numerous white or yellowish warts. It grows both in woods and in open places from June until the freezing weather of October or November

From the painting by Cary

"THE GRIZZLY BEARS IN THEIR DENS"

When in 1805 Lewis and Clark made their memorable exploration of the Northwest, penetrating to the head waters of the Missouri and to the mouth of the Columbia, the grizzly bear had not yet learned to fear the white man's noisy implement whose bite stung so sharply. Tradition says that these powerful and ferocious animals could bring down even a bison. Now they have become the shyest of game and are well-nigh extinct

Recollections of the Old West

APPRECIATION OF THE HISTORICAL CANVASES OF INDIAN AND PIONEER AMERICAN LIFE PAINTED BY WILLIAM DE LA MONTAGNE CARY

By GEORGE BIRD GRINNELL

With illustrations from photographs of a selected series of the paintings

THE swift passage of current events drives from the mind of the average man almost everything except the incidents of today. Most of us forget that this country has a history of nearly three hundred years, of which, to the men then living, each year was as important as 1917 is to us. If there were fewer people in those years, and interests were less diverse, yet the age-old questions of daily work and daily food existed then as now.

For the people who today inhabit the trans-Mississippi West, the period extending from the journey of Lewis and Clark up the Missouri River to the completion of the first transcontinental railroad, ought to possess a stirring and romantic interest. President Jefferson ordered the explorations made by Captains Lewis and Clark, but long before they ascended the Missouri, the prospect of securing the skins of wild animals—with the beaver always in the lead—had been beckoning the explorer westward into unknown lands. In the dry Southwest in the early part of the nineteenth century an attraction was the hope of profitable trade with the Spanish settlements, but for all the Northwest up to the time of the discovery of gold in California, beaver was the lure that led on the explorer as relentlessly as ever fabled gold mines drew the Spanish conquerors.

Recently there has been on exhibition in the American Museum of Natural History a collection of paintings by William de la Montagne Cary, which is of much historic interest. Most of the scenes were painted between the years 1861 and 1875, and present faithful pictures of many phases of plains life before the coming of the railroad.

Mr. Cary and his two companions, Messrs. W. H. Schieffelin and E. N. Lawrence, left New York in the spring of 1861, made their way to St. Louis, and from there up the river by steamboat toward Fort Benton. One may imagine how the places and the people and the methods of getting about impressed these city boys. We can picture the slow progress of the steamboats up the river; the way in which the vessel walked on her "stilts" over the sand bars; the stops at the different forts with their motley gatherings of Indians and of capoted and brass-buttoned fur traders hurrying to the landing to see the boat come in and depart; the tying up to the bank to cut wood for the furnaces; and the hunting excursions made by the young men during these stops, while men felled and split the wood and carried it aboard.

Few military posts existed in the Northwest in 1861; those that were famous in the Indian wars a few years later had not yet been established. In 1861 a fort was a place for storing goods to be used in the fur trade, and such forts must be strong to resist possible attacks by Indians. As noun, adjective, and verb the word "fort" had a wide currency in fur-trading days,

although it is now obsolete in this old sense.

An important place at which they stopped was old Fort Berthold, named after Bartholomew Berthold, the Tyrolese, that early trader who had a share in one of St. Louis' early fur companies and who in 1812 erected the first brick warehouse in St. Louis. Fort Randall was one of the few military posts which our travelers saw; Fort Abraham Lincoln was not established until 1872.

Above Fort Union, at the mouth of the Yellowstone, the "Chippewa," freighted with goods for the Blackfeet Indians, and carrying among her passengers two or three English people seeing America, Andrew Dawson—the agent for the Blackfeet—and the three young travelers, was set on fire through the carelessness of one of the hands, and, having burned nearly to the water's edge, a large quantity of powder at length exploded and completed the boat's destruction. The Indian goods were scattered far and wide and lost, as was most of the baggage of the passengers. Young Cary, whose pencil had been busy ever since he left New York, lost eighty sketches. There was no loss of life. The passengers and crew returned to Fort Union and waited there for weeks. Mr. Dawson and Mr. Carroll went to Fort Benton, about four hundred miles up the river, and succeeded in bringing down to Fort Union wagons to take up the trading goods and annuities to the Blackfeet Indians.

Fort Benton was then the metropolis of the Northwest—the point where all the furs to be sent to St. Louis were brought together and shipped down the river. It was the great center of the fur trade for the northern United States. At Fort Benton they saw not a little of the Blackfeet Indians, met the famous chief Little Dog, hunted buffalo, and finally, carrying their baggage in a Red River cart drawn by two horses tandem, they set out on horseback for the Pacific Coast. When they reached the broken mountains, it became necessary to abandon even so rough and ready a vehicle as the Red River cart, and from there they went on with pack animals.

On their westward way they stopped near Hell Gate, at the camp of Captain John Mullan, who was then building the famous Mullan Road through the northern Rockies. Serving under him, and doing the road-building work, was Lieutenant Phil Sheridan, later to become the cavalry hero of the war between the States, and finally in 1888 General of the United States Army. They passed the Cœur d'Alene Mission, went on to The Dalles, and finally reached the town of Walla Walla, and from there by stage and steamer went to San Francisco. As far as the wilds were concerned, this was the end of their journey. From here they made their way south and east, and by way of Panama ultimately reached New York.

It is not easy for us now to realize how long it is since this journey was made, but if we remember that a territorial government was given to Dakota in March, 1861, just before Mr. Cary started from New York, and that the territory of Dakota included the present states of North and South Dakota and parts of Montana and Wyoming, we have a suggestion of the changes that have taken place since then. Nebraska was a territory and did not become a state until 1867—six years later. Railroads were unknown in the country west of the Missouri. The old bull team still made its slow way across the plains, and the individual immi-

From the painting by Cary

"A CROW HUNTING CAMP"

This picturesque camping scene, which might be on a tributary of the Big Horn or of the Yellowstone, is typical for the Plains Indians of the early days. The hunters are bringing back from the buffalo hunt their loads of meat, the food by which they supported life. The horseman in the foreground is not one of the hunters, as evidenced by the war shield carried on his back

From the painting by Cary

Watching the Fire Canoe.—We are outgrowing the possibility of being greatly surprised at any mechanical marvel, since the past half century of progress in invention, and it is impossible for us to appreciate fully the stupefaction of the Indians at their first sight of a steamboat. It was to them a great boat on fire, which moved without being paddled, and so was alive

From the painting by Cary

Crossing the Plains in '49.—Travel on the plains in the days of our grandparents and great-grandparents was not without its threats of peril. There was the excitement of hunting the buffalo, antelope, and grizzly bear on the way; and especially to be considered was the danger from encounters with Indians

From the painting by Cary

The Prayer to the Rainbow.—The rainbow, a great mystery to the Indian, was explained by him in various ways. He knew that when the bow appeared the rain usually ceased, so he called the rainbow a trap which caught the rain. An interpreter will sometimes call it a fishing line, meaning really a device to catch something

From the painting by Cary

Winter Supply Train.—A stout heart and a firm purpose went together in the makeup of the pioneer, and they were both needed to sustain him during the hours of the long night when he rode through snow and cold at the head of a supply train

From the painting by Cary

The Trapper's Christmas Carol.—This painting of wolves howling around the snowed-over cabin recalls the many tales which have been told of experiences with ravenous droves of these animals in winter when their food was scarce

From the painting by Cary

Return of the Northwest Boundary Survey, 1874, which marked the boundary line between the United States and the British possessions to the north as defined by the international convention of 1818. Among those in the nearest boat are Major Twining, who was in charge of the survey, Capt. F. B. Greene, and Mr. Cary

grant sometimes piloted a wagon drawn by a mixed team which might include a pair of horses, a cow, and a steer. Until a year or two before, the wagons of toiling gold seekers had borne the legend "Pike's Peak or Bust," and it was not until after this party had started on its journey westward that the first daily stages had begun to run to the Pacific Coast—between Atchison and San Francisco.

Not long before, gold had been discovered in what are now Idaho and Montana, and the troublous times were about to begin in those mining camps when stern necessity compelled the adoption of the code of "Judge Lynch," since, except the law of might, no law existed. Of those who took part in these stirring scenes, were such strong and good men as former Senator Wilbur F. Sanders, Honorable N. P. Langford, and former Governor S. T. Hauser, of Montana.

In the years 1864, 1865 and 1866 there were wars with the Indians of the Plains, which cost many lives and a vast amount of treasure, and about 1868 the United States Government established a number of military posts through the western country, at which were stationed small bodies of troops which tried to control the Indians. On Mr. Cary's later trips to the West, he stopped and was entertained at certain posts which in their day were famous, but have long been abandoned and are now forgotten. Each one of these military posts contributed its mite to the quieting of the aboriginal population and to the development of the great country that lies beyond the Missouri.

The artist's visits to the West in those early days brought him in contact with a multitude of men then active and later famous, most of whom have long since passed away. Of the army there were General Sheridan, General Custer, Captain Mullan, Major Twining, General Greene. Dr. Elliot Coues, the ornithologist, represented science, while among pioneers who may fairly be called empire builders were Andrew Dawson, Mat Carrol, George Steele, Broadwater, Kipp, and not a few others.

In 1874 Major Twining, who was in charge of the Northwest Boundary Survey, invited Mr. Cary to accompany the Survey. He was unable to accept, but he was in the West when the Survey returned, and, in fact, came down the river with Major Twining and General Greene as far as Bismarck, North Dakota, to which point a railroad had then been built. An effective picture of the procession of the Northwest Boundary Survey boats is in the collection lately on exhibition. General Custer invited Mr. Cary to accompany him on the Terry expedition in 1876, but Cary did not go.

Mr. Cary has a keen eye for the picturesque and striking, and to the old-timer many of his pictures call up thrilling memories. Today those who can recall such scenes as his "Crossing the Plains in Forty-Nine" are few in number, but many men have witnessed Indian ceremonials akin to that shown in "The Prayer to the Rainbow," while those who were much in the West in early days will recognize the fidelity to nature of the "Crow Hunting Camp" and the picture of the little Indian boy feeding his pet crow. Mr. Cary paints things as they were, not as he thinks they ought to be. He does not insist that all his Indians wear war bonnets, after the method of so many of the modern painters. His efforts are to represent what he saw, and his scenes of western and Indian life possess a real historic value.

Travel on the plains and in the mountains between 1861 and 1874 was not without its adventures and its thrills. Hunting experiences were many; buffalo hunts and stalks for smaller game were exciting; grizzly bears and wolves threatened, and sometimes Indians captured. He who had a part in such events cannot forget them, and it is a joy to have one's recollections stirred by paintings of these old-time scenes.

From the painting by Cary

Indian Boy Feeding His Pet Crow (a portion only of the painting).—Indian children, like all others, are fond of pets. Besides their puppies, they often had young magpies, crows, antelope, foxes, rabbits, and perhaps even a buffalo calf

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EDITORIAL NOTE.—The JOURNAL counts it a privilege to print this article by Dr. George Bird Grinnell, who writes so charmingly of the time depicted by the Cary paintings, yet lets fall no word of his own experiences of the Early West and of his authority as a writer on that period of America's development. For those not acquainted with Dr. Grinnell we give the following brief account of his years in the West and activities there, and also of his very notable achievements in the direction of conservation of our forests and wild life.

His western experiences began immediately after his graduation from Yale when in 1870 he set out under Prof. O. C. Marsh on a six months' expedition in search of fossils. Four years later he accompanied General Custer's expedition to the Black Hills of Dakota, and in 1875 he accompanied Colonel—afterward General—William Ludlow on his survey of the country from Carroll, Montana, to the Yellowstone National Park.

In 1885, and in subsequent years, he explored the region, then unknown, which is now the Glacier National Park, making the first sketch map and naming some of the natural features. About 1895 he took up, together with Senator T. H. Carter, of Montana, the question of setting it aside as a national park, and in May, 1910, the Glacier National Park was finally established. It was in 1895 also that he was appointed United States commissioner to treat with the Blackfeet and Fort Belknap Indians for the cession to the United States of a portion of their land.

Dr. Grinnell not only was connected with the development of the West in this public way, but also identified himself personally with the pioneer life there to the extent of owning and managing a horse and cattle ranch in Wyoming from 1882 to about 1900.

For many years he has been interested in forest preservation and the conservation of wild life, and he worked long in behalf of the establishment in New York City of a zoölogical park—an establishment finally accomplished by the energy of Mr. Madison Grant in founding the New York Zoölogical Society. He organized the Audubon Society for the protection of birds as early as 1886, and it was while president of the Forest and Stream Publishing Company and editor of its magazine that he used his opportunity through that journal to conduct a long fight for the preservation of the threatened integrity of the great Yellowstone National Park.

Dr. Grinnell is the author of many books dealing with the early history of the West and with Indians—and the editor of others. In 1870 and the years following he spent much time in the Old Pawnee earth-lodge village on the Loup Fork, where the town of Genoa, Nebraska, now stands. In 1872 he accompanied a camp of four thousand Pawnees, Omahas, and Otoes on their summer buffalo hunt, and some of the incidents of this trip are described in his early book on the Pawnee Indians. Later he saw much of the Blackfeet, the Cheyennes, and certain branches of the Arapahos. Dr. Grinnell has recently become connected with the American Museum of Natural History as research associate in ethnology.

Forestry and the Paper Supply

By BARRINGTON MOORE

WE have all suffered and are still suffering from the high price of paper. Forestry, the science of wood production, can remedy this evil by increasing the supply of raw material used in making paper, for wood is now almost the only paper material used in this country. Forestry offers two ways of increasing the supply of paper pulp; first, through increased forest productivity due to the application of forestry to the management of timberlands; second, through research on the paper-making possibilities of woods hitherto not used for paper. Although the discovery of new woods will yield quicker measures of relief for overcoming the present shortage, forest production must in the long run be our main reliance. Productive forests require not only the skill of the forester, but also popular understanding and support of his point of view and aims. Everyone knows that the forester must "make two trees grow where one grew before,"—but how?

There is only one sure way: by bringing his methods into complete harmony with the forces of nature, which, in the last analysis, must grow the tree. The first step is, then, to gain an understanding of the natural forces which control the forest. This is by no means a simple matter, for not only are the controlling factors themselves difficult to measure, but also there is the exasperating yet fascinating problem of the response of the living tree to each of these factors separately and to all acting together.

Knowledge of all the forces on which the forest depends will be acquired only by the most earnest and painstaking research. The influence of varying degrees of moisture, of heat and of light, and of different kinds of soil, upon the growth and reproduction of each kind of tree must be studied. In these studies the accumulated knowledge of meteorologists, physicists, chemists, plant physiologists, agronomists, and others, is brought into full play. Research often appears to the general public to be but remotely connected with the immediate object, growing trees. Quick results are demanded, and research is confused with invention. Let us not forget that research precedes invention. Thus we owe aëroplanes to Langley, who studied the lifting powers of moving planes; wireless telegraphy to Maxwell and Hertz; and our freedom from many forms of disease to Pasteur. If forestry is to have a secure foundation the public must accept the fact that the fundamental researches are the things that count. They must not be swept along by the all too prevalent desire for something "practical," but must know that the most fundamental is the most practical in the long run.

In forestry the foundation is pitifully weak. Not only do we lack the data needed for devising the best methods of cutting the forest, but we lack even the knowledge on which to base experiments designed to secure these data. Why? Because forestry has been subjected, even more than most professions, to public pressure for these supposedly "practical" results. Foresters have been compelled to spend all their time and energy in showing the wood-using industries and the general public the need for forestry, and in devising and applying methods for handling such timberlands as fell under their care.

Circumstances have, perhaps, made

this unavoidable. In this country forestry is different from what it is in Europe. The demands are different. In Europe every part of the tree, even to the twigs, can be sold at a profit. In the United States only the large logs from the more valuable kinds of trees can be profitably utilized. A large percentage of the felled tree is left to rot in the forest, and an enormous quantity of wood is wasted at the sawmills because it cannot be marketed except at a loss. The waste of our sawmills represents not only a dead loss, but actually costs the lumbermen of this country $6,000,000 a year to destroy.[1]

Thus economic conditions have hitherto permitted the practice of forestry in this country only in the more thickly settled regions possessing good markets for forest products, and on lands owned by the Federal Government, by states, by large institutions, and by corporations which can afford to wait for their returns. American forestry has therefore required building from the ground up, so to speak. It has required ingenuity and business acumen rather than science. But the opportunities for research are increasing, especially on the vast areas of government-owned forests, and it behooves both foresters and the general public to see to it that a solid foundation of scientific knowledge is at hand in advance of the demand for a practical application of this knowledge.

Our pulp lands are now growing less than half, probably not more than a quarter, of the raw material they are capable of yielding under intensive forestry management. The results of any measures taken to increase forest production cannot, however, be felt for a number of years, for it takes a long while to grow a tree.

The Forest Products Laboratory at Madison, Wisconsin, established in 1910 under the United States Forest Service, has been working on the principles involved in the manufacture of paper pulp, and on the possibilities of various woods. It has a staff of experts and equipment for carrying through any process from beginning to end on a semicommercial scale. In addition, tests of ground pulp have been carried out on a commercial scale at another laboratory. It has been found that fifteen woods in addition to red spruce are suitable for the manufacture of a grade of ground wood that can be used for news print. Tests in running the paper from these woods through commercial presses have been entirely satisfactory. The significance of this will be realized when we consider that the bulk of the news print now comes from red spruce, a tree less abundant than several of the suitable trees, and insignificant in quantity when compared with the total volume of all the available woods. For the sulphite process eleven woods have been successfully made into pulp on a semicommercial scale; and fifteen new woods have been found suitable for the soda process. The Forest Service has found that practically all coniferous woods can be manufactured into kraft pulp.

Forestry can, with public support, remedy the shortage of paper. It can do the same for all other forest products. Last, but not least, all this can be done without diminishing in any way the value of the forest as a protector of stream flow, and as a source of health and pleasure for humanity.

[1] Forestry does not appeal to lumbermen because it involves sacrificing part of their present returns for the sake of the future. The holding of forest lands costs money in taxes and fire protection, the taxation alone being a sufficient discouragement in many states, even though there were not the ever present risk of destruction by fire. Obviously it pays better to "cash in" and invest the money in stocks and bonds, which yield just as much as a permanent forest and are far less trouble and risk.

A Buffalo Bullfight

By ED. D. CRABB

Formerly of the United States Forest Service

This fight occurred in the Wichita National Forest and Game Preserve, near Cache, Oklahoma, in September, 1916. There are 61,640 acres in this forest and game preserve. Of this number of acres there is an enclosure of eight thousand acres constituting the so-called "buffalo pasture." The fence, of heavy woven wire, around this pasture is about six feet high with two heavy wires above it, and is supported by large oak or round steel posts. This fence is sixteen miles long, and encloses mountains and flats, timber and prairie, as well as some beautiful stretches of creeks that afford an ample supply of sparkling cold water. The native grasses form the richest and most luxuriant pasturage that Oklahoma affords.

During the breeding season most of the buffalo bulls are segregated from the herd[1] in a two-hundred-acre bull pasture, and here are staged some great free-for-all fights. On one occasion during a fight nearly a quarter of a mile of woven wire fence was torn down, not even one of the steel posts remaining upright after the bulls were finally separated. It was in this pasture that the younger bulls of the herd killed "Quanah Parker," a twelve-year-old bison shipped here from the New York Zoölogical Park and named in honor of the late chieftain.—ED. D. CRABB.

THE large, surly, nine-year-old buffalo bull, "Black Dog," was turned into the field with the herd one morning late in September, and when he was a short distance from the herd another bull, named "Comanche," challenged him to a fight. After but a few short, sharp rounds, however, "Comanche" agreed to let "Black Dog" share the herd's company with him. Such was not the decision of "John Kerr," a powerful bull of five summers, who immediately attacked the visitor savagely. As a result of his last encounter, "Black Dog's" spirits were high, but his wind was short, so "John Kerr" had little difficulty in thrashing him soundly in less time than it had taken the former to whip "Comanche." After this unwelcome reception, the panting "Black Dog" repaired to the farthest side of the pasture. Early in the afternoon when he had rested and regained his wind, the mighty wrath which had been kindled in his heart that morning goaded him on to another encounter with his victorious rival, "John Kerr."

When "Black Dog" topped the hill and started down the slope toward the herd, he gave a mighty snort and bawl which were answered by "John Kerr" in a way which seemed to bristle with defiance. This reply, however, did not frighten "Black Dog," who answered by viciously tossing his great shaggy head, then wallowing and violently thumping his hump on the ground and kicking his feet in the air. This formal announcement being over he ambled leisurely toward the herd, emitting powerful "brawps," that sounded as if they were coming from the throat of a locomotive, while pawing the dust over his back as if he were master not only of the herd, but of the whole world. When "Black Dog" was about two hundred yards from the herd, he began threatening battle in dead earnest. Wallowing in the dust, the powerful brute would strike the turf mighty whacks with his hump, kick up his feet, roll his eyes, and toss his great,

[1] The fifteen bison that formed the nucleus of the herd in the "buffalo pasture" of the Wichita, were presented by the New York Zoölogical Society from its Zoölogical Park herd.—EDITOR.

The eight-thousand-acre buffalo pasture in Wichita National Forest and Game Preserve—with part of the herd coming to be fed (photograph made in January). (The woven-wire fence, six feet high and sixteen miles long, is heightened by two wires above and supported by large oak or steel posts)

His Majesty, "John Kerr."—Since his desperate encounter with "Black Dog" last September, in which he badly worsted his antagonist, this powerful five-year-old buffalo has been absolute monarch over a realm of eight thousand acres and a herd of eighty-two buffaloes

shaggy head. It was not long before "Black Dog" advanced to within about one hundred yards of the herd, then halted, and again pawed up the earth, while facing his adversary. After he had thumped his hump harder and tossed his heels higher than he ever had before, he arose and shook his head more fiercely than he had at any other time, and advanced in a trot toward his opponent. During all this time "John Kerr" had likewise been threatening battle, and now he trotted out of the herd to meet his adversary.

Then began as fierce a battle as ever took place on the plains between two members of the cow family. The two maddened brutes clashed with the force of a long line of freight cars bumping together, and each received the other on his horns. It was then very apparent that each tried to receive the other's blows on his horns and the top, or poll, of his head; also, that those curved,

short, stout horns, instead of being placed too high up, as had seemed, and too far back on the bison's head to be of any use, are placed just right. When the horns are brought into play, the sensitive nose is far back out of harm's way. Vicious thrust was followed by skillful parry, and the blows fell fast and heavily. "Black Dog" beat down "John Kerr's" guard and gored him in the neck and shoulder. "John Kerr" stepped sideways, and right lively too, but "Black Dog" kept up with him, and for several seconds "John Kerr" was unable to get away from those merciless, twisting horns of ebony. The veteran fighter seemed to feel victory ahead, but his adversary, who was younger, longer winded, and more nimble, evaded the weapons of his opponent, and charging, beat past his guard and gave him a vicious side thrust in the neck that brought a handful of hair. This made the old monarch still more angry, and he charged savagely while "John Kerr" nimbly warded off the blows with his horns. "Black Dog" charged again and again, but each time his opponent received the blows on his horns. Finally "Black Dog" tried to push his adversary backward by means of sheer brute strength and weight, and made some progress—but at what fearful cost! Tearing up the turf as they went, the mighty brutes traveled southward about a quarter of a mile.

"Black Dog's" tongue was lolling; his feet were leaden weights. He had entirely given up the offensive and tried only to defend himself. "John Kerr's" horns tore off bunch after bunch of the kinky, chocolate-colored hair. Finally his horns found "Black Dog's" shoulder and he gored him mercilessly, but so thick is the old bull's hide that "John Kerr's" horns failed to bring the blood. Poor old "Black Dog," with lolling tongue and heaving sides, offered no further resistance. He was hopelessly whipped and "John Kerr" was master of the herd.

Even to this day "Black Dog" leads the life of a hermit, and "John Kerr" is absolute monarch over a realm of eight thousand acres and a herd of eighty-two buffaloes. But the monarch of the herd today will be the hermit of tomorrow. A younger and more powerful bull will succeed "John Kerr," just as he succeeded "Black Dog." The herd may have a new leader with the advent of this coming season, and "John Kerr" will have passed into oblivion.

Crocker Land Party Safe

CABLEGRAMS VIA COPENHAGEN FROM LEADER OF THE EXPEDITION

DURING the past three years, while many millions of men, crowded into the relatively few square miles which constitute the seat of war in Europe, have been reducing the reserve resources of the world with incredible speed, it is reassuring that a few other men in the Arctic far to the north of us, a mere handful in the million and more square miles of unexplored land and sea, have been adding to the world's resources. They have made discoveries of coal and metals and rich animal life, even of new lands, and while these are not available for civilization today, there is no doubt that they will be made available, as have those of Alaska, when needed in the future.

On June 4 Henry Fairfield Osborn, chairman of the Crocker Land committee,[1] received a cablegram from the leader of the Crocker Land Expedition, through the American Minister in Copenhagen, as follows:

"Spring trip, 1916, very successful. Reached Finlay Land. Mapped unexplored shores North Cornwall. Museum records left at many important points. Many specimens secured. Plan for further exploration in March [1917]. Would advise good steamer be chartered for relief."

The announcement that the men are safe and have had a large measure of success was a matter for rejoicing. The good news counterbalanced the disappointment of 1915 when Peary's "Crocker Land" was proved to have been a mirage, and ended the fear felt in many quarters, especially for Dr. E. O. Hovey, of the American Museum, who was in poor health when the last word came, about one year ago. The satisfaction was increased by a second cablegram giving many details. The relief ships of 1915 and 1916 failed to reach Etah, but Dr. Hovey and Captain George E. Comer, of the first vessel, succeeded in covering the distance from North Star Bay to Etah in a motor boat. Thus all had been together and well, with a "good warm house, plenty of fuel and an adequate supply of food to last until August, 1917."

The trip to Finlay Land passed over "excellent sledging surfaces throughout," and through a *"wonderful game country, with wolf, caribou, musk ox, seal, hare, ptarmigan, lemming, fox, and polar bear."* There was *"much coal all through the region."* Finlay Land was reached on April 19 after twenty-nine days' sledging. It seems that game failed west of the ninety-seventh meridian and so when Finlay Land was reached "lack of dog food compelled retreat."

On returning toward Etah, North Cornwall Island was visited and its shore mapped along the north, east, and southeast; also five islands, not heretofore recorded, just off the coast of North Cornwall, were put on the map; also discovery was made of an island off the eastern coast of Amund Ringnes Island. Return to Etah showed "1350 statute miles covered in 56 days"—which means the very high average for Arctic travel of twenty-four miles per day. The return was made in considerably less time than the advance, in 24 days as against 29, allowing for the stay on Finlay Land of the 3 days mentioned in the cablegram. The message further makes mention of various lines of scientific investigation, and speaks confidently of success. This word was sent out from Etah[2] during the Arctic night, 118 days after the disappearance of the sun.

The Crocker Land committee will proceed with all rapidity in its plans for sending the steam sealer "Neptune" as a third relief ship. If this ship fails to reach the men, they will be compelled to resort to "Eskimo methods of living—an igloo for shelter, skins for clothing, and meat for food." The "Neptune" will be in charge of Captain Robert A. Bartlett, of fame in connection with the Peary expeditions. The cost of the expedition has been heavy, but the scientific results, added to the possible commercial and industrial advantages coming from it in the future, are more than sufficient in value to balance the monetary expense.

[1] Composed of representatives of the American Museum of Natural History, American Geographical Society, and University of Illinois.

[2] Dr. Harrison J. Hunt, surgeon of the expedition, carried the cabled letter from Etah to Copenhagen, whence he is returning to New York soon. The perilous journey across Melville Bay and southward along the western coast of Greenland was made by sledge. Dr. Hunt was accompanied by Mr. W. Elmer Ekblaw, geologist and representative of the University of Illinois, who also will probably soon find an opportunity to sail from southern Greenland to Copenhagen and thus reach civilization.

"The Bird Study Book"

REVIEW OF A NEW BIRD BOOK OF GREAT CHARM

IT IS well known to all who have tried to popularize science how difficult it is to write in such a way that the advanced student as well as the beginner finds the reading so interesting that he enjoys every word from beginning to end. To condense the greatest amount of information into the smallest compass and make it also entertaining is an art. Mr. Pearson not only possesses this art, but also knows how to season it with a strain of delicious humor. His own enthusiasm is so strong that it transfers itself involuntarily to the reader, making of the merest tyro in ornithology both a well-informed student and an ardent bird lover.

The work covers in its twelve chapters a very large field of bird knowledge, and discusses in a comprehensive way, although concisely, the relations of bird to man. Through it we learn how to identify birds in the field by characteristic movements of various families and even of genera and species, how to study birds in close proximity by erecting blinds, and how to locate bird nests and study them. Particularly fascinating are the stories of bird domestic life, which seems as full of joy and sorrow as that of the average human being. We are told of the tragic fate of a bluebird's nest, of the faithfulness of mated birds, of the large number of unmated birds, of certain polygamous kinds, and of the domestic relations of the parasitic cowbird. In the story of the migration of birds surprising facts, such as the long annual flight of the ruby-throated humming bird across the Gulf of Mexico, are brought out; and the reasons for such long flights, the perils attending them, and the gathering of the birds, with rustling wings "falling dreamily through the sky," are but a few of the many subjects charmingly discussed by Mr. Pearson.

Contrary to ordinary opinion, the author tells us that winter is a good time for the bird student to go afield; that if bird life is less abundant then, so is the human life, and one has the country almost to himself for undisturbed observation. We learn that man is not alone in suffering hardship during the cold season from lack of shelter and food, and attention is called to ways in which we may help our feathered friends.

Most people are in these days aroused to the economic value of birds in destroying the insects which attack our orchards and gardens, but the truth is considerably more vivid after reading Mr. Pearson's pointed statements. Those who believe in the extermination of hawks and owls on the supposition that it would be in the interest of game birds, are admonished that just the contrary seems to be the case. Birds, like all creatures, are subject to sickness, and the quick removal of diseased birds prevents spreading of contagion, which would do more harm than the occasional capture by a predatory bird. The author is backed by all naturalists when he says, "All birds have their part to play in the great economy of the earth, and it is a dangerous experiment to upset the balance of Nature." The harrowing tale of the slaughter of thousands of our most beautiful song birds in order to secure feathers for commerce, creates a renewed interest in the list of the seventy bird reservations which have been established by the Government since March, 1903. The history of the beginning of bird study in the public schools, together with the growth of the movement and its present status, is followed by instructions for forming a "Junior Audubon Class" for bird study.

The Bird Study Book is particularly well fitted for use in school work. It is a volume which will prove most useful to all who are interested in acquiring a greater familiarity with the habits and activities of wild birds, and we believe that no other book supplies general ornithological information in such concise and readable form. Mr. Pearson, to whom the world already owes so much for the immeasurable good he has done and is still doing in connection with the Audubon Societies of the country, has added greatly to his service by this new spread of bird knowledge, and by contributing through this means to the conservation of what we are all drawn to consider the most beautiful and gentle life in Nature's realm—that of our wild birds.

OTTO WIDMANN
Fellow of the American Ornithologists' Union

Courtesy of Doubleday, Page & Company

The illustrations in Pearson's *Bird Study Book* are well chosen for suggestiveness and help enforce upon the reader a new friendly intimacy with birds and a new desire to protect them. The student of nest architecture is impressed by the assortment of materials used and the diversity of situations chosen even among closely related species. The nest of the wild bird is merely a cradle for its young; birds have never evolved the habit of building nests for their personal protection, even for the cold and snowy days of winter. (Photograph of male plumbeous gnatcatcher feeding young, by William L. Finlay)

Courtesy of Doubleday, Page & Company

Ice and snow make food getting a serious problem for the wild bird. The smaller birds gather more closely around the farmhouse, while even the wary ruffed grouse often comes to the orchard. So many are the fatalities wrought by cold snowy weather that only the stronger and more fortunate individuals of a species survive. Much can be done to bring birds about the home or the schoolhouse by placing food where they can readily get it. (Feeding station for birds on the grounds of R. G. Decker, Rhinebeck, New York)

Courtesy of Doubleday, Page & Company

In May, 1910, Mrs. Russell Sage sent to the National Association of Audubon Societies a check for $5,500 with which to inaugurate a plan for bird study, with special reference to the protection of the robin, in the southern schools. So successful did the experiment prove that the system was extended into all the other states in the Union and into the various provinces of Canada. Up to June 1, 1916, there were 559,840 children enrolled under the standard bearing the inscription "Protect the Birds." The photograph shows members of a Junior Audubon class at Fergus Falls, Minnesota

Courtesy of Doubleday, Page & Company

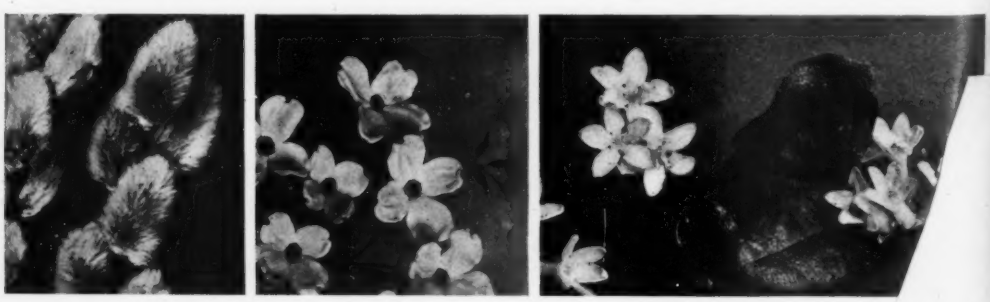
A snowy egret that came home to die.—The most shameful blot on the history of America's treatment of her wild birds is in connection with the white egrets, now entirely killed out in many states. The "aigrettes" so often seen on the hats of the fashionable are the nuptial plumes of the birds. In obtaining these, the hunters kill the adults, exposing hundreds of young birds to die of starvation—a method of killing which history shows has never been followed by even the most savage race of men dealing with their most hated enemies

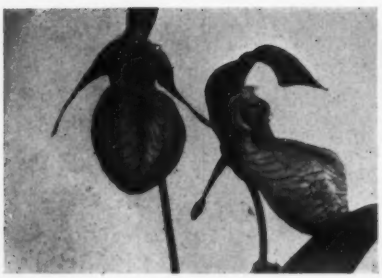
The Conservation of Wild Flowers

Decoration from photographs (by Mary Cynthia Dickerson) of a few wild flowers which stand in need of our greatest care; hepatica, trailing arbutus, Indian moccasin flower, partridge berry, azalea, and fringed gentian are in desperate need, for they are already nearly extinct over large sections of the country where previously abundant

THERE appeared in the *New York Tribune* of May 5, 1901, the following unsigned notice: "Now that spring is really here, the picnicking parties are invading the woods north of the Harlem, and have begun the annual systematic destruction of a large proportion of all wild flowers within reach. The authorities of the Botanical Garden are on the lookout for them, and within their own precincts will guard the blossoms as thoroughly as possible under a well-planned system; but the rest of the Bronx will be at their mercy, and that means death to many a poor little plant. It is not that these ruthless explorers fail to appreciate the beauty of flowers—they 'just love them' in all probability. The trouble arises from their ignorance of the extent of the damage they do, and from an utter inability to comprehend that a flower or anything in the vegetable world has rights which the lord of creation himself is bound to respect. Thanks to the picnickers and alleged botanists, the *arbutus*, loveliest of spring blossoms, has been almost exterminated in the Bronx region. Its delicate pink and white used once upon a time to hide under the leaves all through the northern woods in that part of the suburbs; now it may be found only in spots where it commands less enthusiastic admiration. The mountain laurel has shared a similar fate."

In July of the same year, *The House Beautiful* had several notices on this subject. As there appeared to be considerable interest aroused and many questions asked, I compiled all the notices I could find, including some English ones from the *Daily Mail* and the *Journal of Botany*, and printed in *Torreya* for August, 1901, an article on "Vanishing Wild Flowers." Immediately following the publication of these notices the Misses Olivia and Caroline Phelps Stokes, who had been members of the New York Botanical Garden since 1898, presented to that institution a sum of $3000 to be used for the "investigation and preservation of our native plants." In April, 1902, Dr. N. L. Britton,



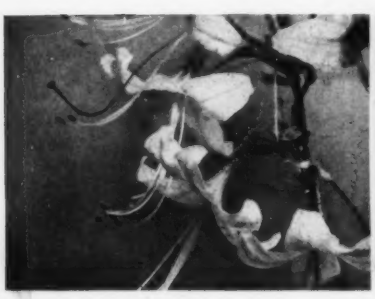


director of the New York Botanical Garden, gave an illustrated lecture at the Smithsonian Institution, Washington, on the preservation of our native plants, and immediately following this, the Wild Flower Preservation Society of America was organized and has ever since coöperated with the Stokes Fund work at the New York Botanical Garden, the writer having acted as secretary of both for many years. In the same year the Society for the Protection of Native Plants was organized in Boston. It not only has distributed leaflets and posters free in all parts of New England but also has coöperated with various horticultural and botanical societies.

The interest on the Stokes Fund has been used in various ways: first, to secure essays, leaflets, and posters that could be distributed to those wishing further information, or to protect their own property from depredation; second, for illustrated lectures to be delivered to schools and colleges in various cities and towns; third, to reproduce in colors, paintings by Miss M. E. Eaton, of some of the rare wild flowers needing protection, accompanied by descriptions; duplicates of these were distributed free to libraries, schools, colleges, and museums; fourth, to frame sets of these as Arbor Day prizes to the schools that agreed to compete and pledge themselves to coöperate in the work of conservation; fifth, to prepare a set of colored lantern slides for use in Arbor Day and conservation talks.

In the fifteen years since this work was systematically begun, the active coöperation of nearly all the schools and colleges of Greater New York has been secured, also that of various towns in the vicinity of New York. The Federation of Women's Clubs has expressed its approval and these clubs are carrying on local conservation projects in various parts of the United States. The Garden Clubs of America proclaim as one of their objects, "to aid in the protection of native plants and birds," and many of them have been giving a series of lectures on both these topics as part of their programs. Chapters of the Wild Flower Preservation Society of America have been established in Washington, Baltimore, Philadelphia, Chicago, Cincinnati, and Milwaukee, and have had a far-reaching and beneficial influence in each of these cities. Conservation of the birds and plants has been accepted as part of the nature work of the board of education of many towns, and the relation and interdependence of birds, insects, and plants has been emphasized in all our lectures; but thus far no simple and practical leaflet has been printed, that would emphasize the balance of life betweeen these groups.

The *Nature-Study Review*, which is dedicated "Primarily to all Scientific Studies of



Nature in Elementary Schools," is devoting eight of its current numbers to animals, birds, butterflies, trees, flowers, and school garden work. In the May number they have adapted the Stokes Fund pledge to read:

"Please help to save our native plants by promising

To protect our native plants,
Not to destroy rare wild-flowers and ferns,
Not to injure any shrub or tree and
Not to set fire to the fields or woods."

The *National Geographic Magazine* has also issued two sets of colored illustrations of "Common American Wild Flowers" with descriptions. All wild flowers in the suburbs of New York City may become as scarce as trailing arbutus, unless all people unite to preserve them; and this is true not only of the suburbs, but also of the parks of Greater New York, and of the New York Botanical Garden and the New York Zoölogical Park. Signs forbid picking or carrying through the parks any plants whatsoever, and persons who disobey are liable to arrest and fine for a statutory misdemeanor.

The attention of visitors to the wild parts of the New York Botanical Garden has been called to the preservation of our native plants by the sign

Do not pick or break leaf or flower.

People must realize that although they are "tax-payers" and "this is a free country" they have no more right as individuals to the flowers in the parks than multitudes of other people have, and that if all of the millions of Greater New York were selfish there would be no flowers for anyone to enjoy!—Mrs. Nathaniel Lord Britton, New York Botanical Garden.

Mirages in the Lower New York Bay

A RECENT article on mirage in the American Museum Journal[1] recalled to my memory some very remarkable mirages, which I saw about ten years ago from my house at Sea Gate (Norton's Point). From my house which faces south, the West Bank Light lies somewhat south of southwest at a distance of nearly three miles. The northern entrance to the Ambrose Channel is on a line from my house to that light, about a mile and a half distant. The Romer Shoals Light lies almost due south, at a distance of four miles, and Sandy Hook Light is a little to the eastward of Romer Shoals and about seven miles off. The highlands of the Navesink are on a line with, and some four miles south of, Sandy Hook Light, and several miles behind the West Bank Light is the southern end of Staten Island.

It is a very common occurrence to see the east shore of Sandy Hook and the coast line beyond (the Seabright shore) raised above the horizon, and occasionally this loom will carry the sky clear under the Navesink Highlands. On a still, hot afternoon, some large houses, towers, and chimneys on the shore of Staten Island will be raised in the air by a mirage, which occasionally is very beautiful, and very suggestive of the picturesque descriptions of the desert mirages. Occasionally even the New Jersey shore, inside Sandy Hook, is raised with a bright line between it and the water.

Frequently the two lighthouses, Romer Shoals and West Bank, which are surrounded by water, undergo a peculiar change of appearance, the lighthouse tower showing clearly through the mirage of the lower part of the lighthouse, but being also raised very considerably. This kind of mirage lasts sometimes for a couple of hours, varying in clearness and size. The water is always smooth, and there is, of course, no wind in the neighborhood of the mirage.

On the day I refer to above, there were two spaces in the Lower Bay in which mirages occurred, separated by a clear space. One of these mirage spaces was on a line with the West Bank Light, the other on a line with Romer Shoals. The air was a little hazy and very still, and the water was very smooth, with lines of different shades of blue and silvery gray on it. The sun was west of south—it was about two o'clock. It was very hot. I first noticed that the West Bank Light was distorted, and then,

[1] Reeds, Chester A., A Perplexing Phenomenon—Mirage, American Museum Journal, December, 1916.

as a steamer came along and entered the Ambrose Channel, she underwent strange changes. The part of the hull that was not in the mirage space was of a natural color. The distorted portion was a silvery gray. It was just as if a filmy screen rose up in front of the ship, enlarging her height (not her length) until she was twice her actual height or more. Again, the curious effect was noticed of the funnel showing through the mirage. The vessel passed out of this area, steamed for a while in a clear area, and then passed through another mirage area, undergoing the same distortion. And a number of other steamers going to sea underwent the same changes. As the afternoon wore on, far more beautiful mirages were seen, for to the southeast of us were several sailing vessels becalmed. Of these, a few were reflected upside down, more or less perfectly, but one, a schooner, about two miles offshore, was reflected in two perfect images, the lower one reversed, the upper one right side up. Mrs. Davis and I examined the mirage with a powerful glass, and it was astounding to see how clear the mirrored vessel was. Where the two upper mirages met, the line was hazy, but the upper part of the hull, the masts, sails, and spars were as clear and sharp as in nature. This is the only double mirage I have seen on the Lower Bay in thirteen years, and this schooner was the only vessel that happened to be in just the right spot. I have always regretted that I had no camera handy to photograph this mirage. The single-reflection mirages have occurred on other occasions, but I never saw so wonderful a display again. Later still a gentle breeze sprang up, and the mirage effect vanished.

One other curious effect of the condition of the atmosphere should be mentioned. To the west of the first mirage area, and quite a distance off, two or three schooners lay with their sails, including several jibs, set. Now, these sails, especially the jibs, appeared crinkled, very much like the surface of a glass negative on which the gelatine has frilled. This effect I have seen several times, just as the enlarging of the lighthouses and vessels is not uncommon. A very perfect reversed-image mirage Mrs. Davis observed the next summer on a similarly still, hot day. I have seen it clearly but once.

Another curious effect of the mirage-producing condition of the atmosphere I noticed on another occasion: vessels coming in from Ambrose Channel Lightship had their masts lengthened out to an extraordinary extent. I remember particularly one of the American liners (the "New York" or "Philadelphia") whose funnels appeared to be hundreds of feet tall, and whose masts were lengthened out like immensely tall, wavy rods. The hull was not distorted at all. This lasted for a period of about a quarter of an hour. The effect was rather uncanny.

It will be seen that it is not necessary to go to out of the way places to see mirages. They can be witnessed in the Lower New York Bay just below the Narrows, although the reversed mirage is far from a common occurrence.

GHERARDI DAVIS

Museum Notes[1]

SINCE the last issue of the JOURNAL, the following persons have become members of the Museum:

Life Members, MRS. CHARLES ALBERT PERKINS and MESSRS. E. C. CONVERSE, LEWIS L. DUNHAM, MARSHALL FIELD, HARRY S. HARKNESS, ARTHUR F. LUKE, JOHN A. SPOOR, and WILLIAM M. WOOD.

Sustaining Members, MESSRS. SAMUEL BIRD, JR. and THEODORE H. LAMPRECHT.

Annual Members, MRS. CHARLES W. COOPER, MRS. GEORGE ROSE, MRS. FELIX T. ROSEN, MISSES ELIZABETH A. ACHELIS and HELEN A. DE WITT, the REVEREND KARL REILAND, DR. SAMUEL M. EVANS, DR. FRANK C. HOLLISTER, DR. S. E. MEZES, and MESSRS. CHARLES W. BALLARD, EDWIN BEACH, RANDOLPH BEADLESTON, J. ARTHUR BROOKS, JAMES BYRNE, F. KINGSBURY CURTIS, MORTIMER B. FOSTER, ELLERTON JAMES, J. R. MCGINLEY, CLIFFORD L. MILLER, STUYVESANT F. MORRIS, EDWIN H. MULFORD, FANCHER NICOLL, H. S. PAINE, DAVID PATON, JAMES H. PERKINS, SINCLAIR RICHARDSON, JOHN S. ROGERS, RICHMOND TALBOT, CHARLES C. WALKER, SPENCER WATERS, and C. WEIDENFELD, and the Parish School of the Evangelical Lutheran Church of St. Matthew.

[1] Because of the delay in this issue of the JOURNAL, it has been possible to include certain notes which otherwise would not have appeared until the first fall number.

SINCE the morning of the announcement of the death of the Honorable Joseph H. Choate, last survivor among the founders of the American Museum of Natural History, the life-size portrait painted by the Princess Lwoff-Parlaghy, taken from its permanent place in the Members' Room of the Museum, has hung conspicuously in Memorial Hall above the tablet bearing the names of the founders. It will be remembered that Mr. J. Pierpont Morgan died only four years ago, in April, 1913, and on that occasion Mr. Choate, as the sole survivor, in speaking at the memorial service in the Museum, touched feelingly upon the relations these founders and early promoters had borne to the young Museum. Now with the passing away of the last of this noted assemblage of men, the institution feels itself swept forward into other generations and unknown forces. Building on the impetus that came from this early time, it can only loyally shape its work more and more to meet the scientific and educational needs of the new generations wherever history leads—which today is, unbelievably, into the national problems and personal sacrifices of a world war.

FUNERAL services for Mr. Anson Wales Hard, a trustee of the American Museum since 1894, were held at 10 o'clock on Friday morning, June 22, in St. Bartholomew's church, Madison Avenue and Forty-fourth Street. Mr. Hard not only served on important committees of the Board of Trustees of the Museum but also made notable additions to the collections of the institution. The American Museum was represented at the funeral by President Henry Fairfield Osborn, Trustee Charles Lanier, and Assistant Secretary George H. Sherwood.

A SPECIAL meeting held by the president and trustees of the American Museum on the evening of May 23, in the interest of food values and economies and the conservation for war, aroused great interest and drew a large audience. President Henry Fairfield Osborn presided, making a brief preliminary address in which he called attention to the fact that this movement is nation wide and is eminently necessary whether the war continue for some years or end soon.

Dr. Graham Lusk, professor of physiology at Cornell University, who was the first speaker, gave a very energetic address on "The Conservation of Food Resources," bringing out some new and interesting facts. He stated that the less a man weighs the less food his body requires, so that by taking thought a community may support itself for a long time on a restricted diet. Since the value of all food depends on the number of heat calories which it will produce, Dr. Lusk strongly advocated the labeling of all food packages with the cost per thousand calories, and demonstrated his argument with packages of different kinds of food which he so labeled. He also suggested the payment of bounties to men who enlist for farm work, in order that the farmer may be sure of getting needed help for the harvesting of his crop. The need of body fuel is the dominant factor today, and the food question should have the immediate attention of the authorities. Following Dr. Lusk, Dr. Hermann M. Biggs, New York State Commissioner of Health, spoke on "The Waste of Disease in France in Wartime." That modern science has in a large measure overcome the ravages of the diseases that in former times beset armies was brought out, and it was shown that where these means have failed, it has not been because of their inadequacy but from lack of proper application. The alarming increase of tuberculosis in France was discussed, and the statement made that if the war should cease now there would be no fewer than 500,000 cases of this dread disease to be dealt with in that country. England suffers less in this respect because of better sanitary conditions both before and during the war. We must face the same problems, and must use the means which science has provided to solve them. Mr. George W. Perkins, chairman of the Mayor's Food Committee, was the next speaker. Mr. Perkins emphasized the waste of our food resources, discussing the many kinds of waste and possible means of controlling them. The waste in milk bottles alone in this city is $250,000 a year. Dr. Walter B. James, president of the New York Academy of Medicine, in a talk on "Our Duty of Life Conservation," called attention to the great prevalence of mental diseases and the large number of soldiers who have been sent to the hospitals on this account alone. Lack of proper preliminary examination, as in the case of tuberculosis, is at the bottom of the situation. Dr. James concluded his remarks by urging all present to use their influence toward the diffusion of human knowledge, and toward the encouragement on the part

of the state of all those institutions helping along such lines.

At the close of this address, the audience was invited to inspect the display in Memorial Hall, prepared under the supervision of Dr. C-E. A. Winslow, curator of the department of public health in the Museum, with the assistance of Dr. T. G. Hull, and arranged for the purpose of suggesting to the general public various ways and means by which it may have good food at as low a cost as possible.

In connection with the health and food exhibits at the American Museum there has been issued by the Museum departments of public health and public education a fifty-page *Handbook of Health in War and Peace* by Dr. C-E. A. Winslow. It deals with the problems of personal preparedness in the matters of health, cleanliness, and food. In a foreword Professor Henry Fairfield Osborn says: "There has never been a period in American history when diffusion of knowledge of the laws of nature was a more immediate and a more imperative duty than at the present time. Hundreds of thousands of young men and young women are ready to offer their services and, if need be, their lives. . . . But let not a single life be lost needlessly. Let no constitution be broken by disease through ignorance. The patriotic opportunity of all men of science is to spread the truth, and to spread it as quickly as possible. Let us speak plainly of all the dangers and enemies which surround the soldier and sailor, of those that kill the soul as well as those which destroy the body. The loss to the world of the finest strains of manhood is the most awful curse of the many curses attending war. . . . It is a scientific, no less than a religious principle, that to serve one's country one must be sound in body, sound in mind, and sound in spirit."

The American Museum is beginning to feel the effects of the war in the loss of some of the members of its working force. Mr. Barrington Moore, associate curator of woods and forestry, Mr. Carlos D. Empie, assistant in the mammalogy department, and Mr. Charles Camp, assistant in vertebrate palæontology, have been called to Plattsburg for military service. Mr. Moore has since gone to France in a forestry regiment. Mr. James P. Chapin, assistant in ornithology, also responded to the first call for volunteers, but was obliged to return, temporarily, owing to the reappearance of a physical disability contracted through six years' residence in the Congo region in the service of the American Museum. Mr. Karl P. Schmidt, assistant in herpetology, has gone to engage in patriotic work as a member of the New York State Food Commission with headquarters at Ithaca. Mr. Laurence Ferri, of the Seventy-first Regiment of the National Guard, has already joined his regiment "somewhere in New York State"; Mr. John J. Finn entered a cavalry regiment on the 1st of May; Mr. Charles Schroth and Mr. Charles Connelly, both of the Sixty-ninth Regiment, Mr. Henry Ruof, of the 1st Artillery Regiment, and Mr. Albert J. Kelly, of the 12th Infantry, will go out on July 15.

At the request of General George T. M. Bridges, of the British Commission, a "forestry regiment" is being sent to France from this country to supply for the army of the Allies the timbers necessary in the construction of trenches, dugouts, bridges, and railroads. Vast quantities of wood are consumed for these purposes, the demand being so urgent that men have been taken from the firing line to assist in procuring it. In England, where the greater part of the wood used has thus far been obtained, the work has been in the hands of Canadian battalions, as many as 75,000 men having been engaged in it. One sawmill to a company has been employed, together with donkey engines and railroads, after the usual Pacific Coast custom. Whether the English forests are becoming exhausted, or the shipping facilities are lacking, is not known, but the supply seems to have given out, and France is now offering her forests to be cut. These have hitherto been untouched, perhaps because they were deemed necessary for military purposes, in the way of screening artillery, for instance, and now that they must be used, it is the desire of the government that the work be carried on under the direction of trained foresters.

The forestry regiment is under the command of W. B. Greeley, who has been in charge of the silviculture of this country for a number of years and is one of the ablest men in the United States Forest Service. There are three majors and three staff captains, each of the latter in charge of a different line of work. Each company of the regiment will be a complete working unit in itself, able to handle the whole work

alone if need be. High grade foresters will act as noncommissioned officers. Most of the enlisted men will be lumbermen, millmen, and road engineers. The appropriation provides for twelve specialists, two high grade engineers, and a number of first class sawyers. These last are particularly important, since on the sawyer depends the amount of lumber to be obtained from the tree. It is now thought that three of the small portable mills (of about eight thousand feet capacity) to a company, will produce the best results. Before this forestry regiment begins active work, it will be under strict military discipline for two months. It will then go armed with rifles and in every way equipped as a fighting unit. This is probably only the beginning of the transfer of our scientific forestry experts to Europe, as at least five such regiments will be needed in France, and the work may have to be extended to Russia.

In response to a cable from the French Government that two officers familiar with French conditions be sent over in advance of the regiment, Henry S. Graves, chief forester of the United States, and Barrington Moore, associate curator of woods and forestry in the American Museum of Natural History, sailed for France on June 9. Their purpose is to look over the forests, determine the final details of the needed organization and decide definitely upon the equipment, so that when the regiment arrives there will be no loss of effort.

SINCE April, 1917, the New York Botanical Garden, in coöperation with the International Children's School Farm League, has been conducting training classes for teachers of school gardening. A tract of land near the Arboretum entrance on the eastern side of the grounds, about nine hundred feet south of the Mansion, has been set apart and is now being cultivated by these classes. Instruction is given by means of lectures, practice work, and reading, in those subjects needed by teachers in school garden work, a certificate being awarded to students satisfactorily completing the course. Lectures cover the following subjects: planning the garden; soil and fertility; selection of seeds, germinating, planting, transplanting, and related subjects; also insects to be dealt with in the garden. Elementary forestry and soil conservation are likewise included. Classroom work is supplemented with the spading, hoeing, cultivating, planting, weeding, in fact, all of the work from the entering of the crop to the harvesting. The work is maintained by public subscription.

THE centennial meeting of the New York Academy of Sciences and Affiliated Societies was held at the American Museum of Natural History on the evening of May 28. Professor Michael I. Pupin, Honorary Serbian Consul General and president of the Academy, spoke on the "Relation of Pure Science to the National Crisis," emphasizing what we are all beginning to realize, that scientific research is one of the most valuable assets this country possesses. He made special mention of the work of the National Advisory Committee on Aëronautics appointed by President Wilson some two years ago, with a continuing three-year program which will give the United States as good an aërial service as there can be by that time in the world, the Naval Consulting Board, appointed by Secretary Daniels a little more than a year ago, with the splendid result of an appropriation of several million dollars for the organization of a naval research laboratory, and the National Research Council for mobilizing all the scientific research facilities of the country. Among the problems which press most urgently upon the scientists of our country are the making of optical glass, and the making of nitric acid.

Dr. Nathaniel Lord Britton, of the New York Botanical Garden, gave a summary of the work done by the Academy's scientific survey of Porto Rico during the last few years, in which many of the American Museum's scientists have made investigations. The study of the material gathered is progressing rapidly, and many of the results are now ready for publication. Some of the collections are being returned to Porto Rico to aid in the founding of a natural history museum at San Juan; the rest will be divided among the coöperating institutions. It is hoped to extend the work of the survey into the newest purchase of the United States, the Danish West Indies.

Dr. John Hendley Barnhart gave a summary of the Society's first hundred years of activity; from the time of the formation of the Lyceum in 1817, by about twenty young men connected with the College of Physicians and Surgeons, under the leadership of Dr. Mitchell, with its first home in the old alms-

house in City Hall Park and a library of two hundred books, on through the long years of discouragement and financial difficulties and the annoyance of moving from place to place, through the connection with Columbia University—both on Forty-ninth Street and after the removal to Morningside Heights—to 1902, when it accepted the invitation to make its permanent home in the American Museum building, to the mutual profit and satisfaction of both the Society and the Museum.

A TIMELY bulletin on the subject of "Corn in Montana," in which the history, characteristics, and adaptation of this cereal are discussed, has been prepared by Professor Alfred Atkinson, of the Experiment Station of the Montana Agricultural College. Through it we learn that corn, which is native to this continent and therefore more distinctly American than any other of our farm crops, is today the leading crop of the nation. Corn not only produces a crop of highly nutritive grain but also fodder for the stock, and at the same time leaves the soil in excellent condition for planting small grain without further cultivation, thus providing that rotation of crops so necessary in economical farming.

For some years the notion has prevailed that corn could successfully be raised only within the limits of a certain area along the valleys of the Ohio, central Mississippi, and lower Missouri rivers known as the "corn belt." A study of corn-growing by the Indians, however, proves that maize has been cultivated by them for many centuries in nearly all sections of the United States and even as far north as Montreal, Canada—where Jacques Cartier observed large fields of it growing in 1534. There is now a gradual northwestern corn movement. Few crops show adaptability to so wide a range of conditions as corn, some varieties maturing in eighty days and others requiring two hundred, while corn may be raised successfully by dry farming as well as by irrigation. The limits of possible corn culture are therefore by no means yet fixed.

The Indians were not only the first corn raisers, but also they developed a really remarkable corn culture. According to the Rev. Gilbert L. Wilson, who began work among the Hidatsa Indians in North Dakota in 1907 as an anthropological collector for the American Museum, the Sioux brought the culture from their first home in North and South Carolina, and spread it by means of the various groups into which the original tribe finally broke up. Some of these groups, as the Mandans, Arikara, and Hidatsa, became great corn growers and gradually carried the culture farther west and north in Dakota and Montana. In the Southwest, archæological discoveries would indicate that corn raising has been carried on for thousands of years, and it is still the main crop of the Pueblo Indians of that region—as well as the occasion for many of the picturesque ceremonies prevalent among them.

Through Mr. Wilson's studies among the Mandan and Hidatsa Indians, the first incentive was given to the work of experiment in corns adapted to short seasons. He found that these Indians had several varieties of corn, some of which they were able to grow successfully much farther north than the white farmer had done. The Montana Agricultural College became interested and began a series of experiments which have been followed by such favorable results in corn growing as to create a wide interest. The American Museum has received many inquiries from people in the New England states, where the corn raised by the Indians formed the basis of the varieties developed by the colonists. Some of the results of the important studies made by Mr. Wilson among the Mandan and Hidatsa Indians by permission of the American Museum of Natural History, will appear in a report published by the Montana Agricultural College under the title: "Agriculture of the Hidatsa Indians, an Indian Interpretation."

OF the many visitors who stand daily before the food display in the cases in Memorial Hall of the Museum, few realize that they are looking upon a purely artificial exhibit. Among the materials used in these reproductions of beefsteak, lamb chops, potatoes, beans, ice cream, etc., are paraffin, plaster, and a kind of Japanese seaweed known as agar-agar. Some of the articles are cast in molds, others, such as the very realistic cake "napoleon," must be made entirely by hand. After the mold is made the specimen is cast in wax; then the minute defects of the cast are "tooled" into shape, and finally the perfect casts painted with oil colors, the real article being before the artist as a model. Sliced tomatoes and hard-boiled eggs present great difficulties in re-

production on account of their peculiarly translucent texture. Ice cream is made by boiling wax and flour together, molding into shape, and then cutting into portions and coloring. Chocolate creams, looking temptingly real, are made of paraffin. About two months' time was spent in the preparation of this exhibit, which is designed to bring before the public the calorie and protein values of the various foods commonly used. The artist, Miss A. M. Renaud, has been only three years in this country, having taken special training for her work in Europe. She has been connected with the American Museum for about two years.

FROM the battlefields of Europe, where he was wounded and gassed in the trench warfare of the western front, Captain A. Radclyffe Dugmore of the English army comes to America to tell us something of the exact situation and needs of our English and French Allies. Captain Dugmore was an active participant in the battle of the Somme, in which nearly the whole of his brigade was wiped out. He himself was overcome by gas on the fifteenth day. After six months in the hospitals of France and England, he rejoined his regiment in England, but broke down again some two months later from the effects of the Somme gas injury and was obliged to give up the idea of active military life. Captain Dugmore is sent to this country by the British Foreign Office. He says: "I shall lecture everywhere in the country on the conditions on the other side, what the thing stands for, and what the ultimate aim is. I want to show what we are up against, and why. I want to show England's position, and particularly to remedy certain wrong impressions, due to German propaganda." When asked what he had been doing at the front, Captain Dugmore answered: "What all the other fellows are doing—trying to miss bullets. Sometimes one succeeds very well. Sometimes one does not. The men are splendid. It is almost incredible what they are doing there. We do not have to get behind them and push them to the front, nor look back to see if they are coming. There is no need of urging the men. They come right forward even when they know death is certain." He further said: "If the war crushes the menace that has been hanging over the liberty of the world for all these years, it is worth the sacrifices. Germany is fighting hard still; but the most gratifying thing is that since the battle of the Somme opened she has failed in every counterattack. She has never succeeded in driving a counterattack home. We drove her out of positions in France which she had planned years before the war. Even gas cylinders we captured bore the date 1912." In his lectures throughout the country Captain Dugmore will also tell of the great part taken by the women of England, of their sacrifices, and absolute unanimity of purpose—in order that the men may be released for military duty or government work. Nine tenths of the mail carriers are women, there are hardly any men left in the banks, even the porters at the railway stations are women.

Captain Dugmore is not unknown to the readers of the JOURNAL. In March, 1916, an article appeared in which was described his trip to Africa when he secured for America his wonderful photographs of African game. Some of these pictures have appeared in the JOURNAL, and duplicates of all the negatives secured on the trip are stored in the educational department of the American Museum.

EACH member of the staff of the American Museum has been presented, through the courtesy of President Henry Fairfield Osborn, with a copy of a handbook entitled *Hints to Housewives*, which has been issued by Mayor Mitchel's Food Supply Committee. The book is opened by a patriotic call to housewives to do their bit toward solving the food problem, and contains recipes for cooking, for canning fruits and vegetables, preserving eggs, and much useful information in general on how to buy and care for food.

WORK is in progress on the elephant group for the center of the African hall planned by Mr. Carl E. Akeley. Surely there never has been a scene in the past history of taxidermy and sculpture quite comparable with that today in the elephant studio of the American Museum. The beasts are so gigantic, so vast in their proportions, that the whole visible space of the eighty-foot studio, with thirty feet to the ceiling, is dominated by them and the scaffolding and other paraphernalia for their preparation. There are to be four of these giants of the African jungle in the group. The calf and young bull are practically completed (photographs of them

will be reproduced in the first fall issue of the JOURNAL). Work on the old bull, whose head will tower twelve feet above the pedestal on which he is to stand, is well under way. At present one of the immense sides of the mannikin for him has been clothed in one half of his skin and is now encased in plaster until the skin hardens. The other side is undergoing the process of having the remaining half skin carefully molded over soft clay into all the intricacies of the natural folds and wrinkles and suggestions of tense muscles underneath. Work on the head is begun. The pose, depicted by Mr. Akeley, is one that carries conviction as to the elephant's massiveness and majesty. The measurement from the eye to the tip of the trunk is nine feet and the spread of the ear is more than ten feet. Just now is the very best time to see and understand the process which Mr. Akeley has perfected in the mounting of animals, since each step is in sight—except the final one of reënforcing the inside of the skin with composition and wire netting. So difficult of accomplishment and so vast in amount is the detailed work required that it will be almost a year before the four elephants stand on their feet in the finished group.

MR. HENRY P. DAVISON, treasurer of the American Museum, has been appointed by President Wilson as chairman of the Red Cross War Council, a body of seven members created within the Red Cross for the purpose of responding to the extraordinary demands which will arise from the present war.

DR. FRANK M. CHAPMAN also has been called to Washington as assistant director, Bureau of Publications, for service in connection with the Red Cross. At present he is acting as editor of the *Red Cross Bulletin*, a newly established organ designed to keep subscribers informed of Red Cross activities.

OF the members of the Crocker Land Expedition who returned to civilization in the summer of 1916 by way of a 1300-mile sledge trip across Melville Bay and through Danish Greenland, thence by boat to Copenhagen, Ensign Fitzhugh Green, who was in charge of the cartographic and magnetic work of the expedition, is again in the service of the United States Navy on the steamship "Texas." Also Mr. Jerome Lee Allen, the electrician who was in charge of the wireless, has reënlisted for government service and is at present at Washington, D. C.

THE "Neptune" (see pages 284 and 346), which is to be sent as a third relief vessel to the members of the Crocker Land Expedition in northwest Greenland, is the largest of the Newfoundland sealers. Although built in 1873 she is sound throughout. Her sides consist of sheathing of four inches of greenheart over four inches of oak, covering heavy oak timbers, with a three-inch lining. The space between the inner and outer skins and the timbers of the ship is solidly filled with rock salt, so that the sides of the ship will be practically eighteen inches thick in all parts where contact with the ice is expected. The bow is further reënforced by a heavy sheathing of iron plates, and is backed inside with deadwood. The "Neptune" measures about 190 ft. long by 30 wide and 18 deep. She will carry about 450 tons of coal. Five tons of food will be carried to the expedition to provide against the contingency of another year's detention in the north. Owing to the present scarcity of ships, it was only after the greatest difficulty that the "Neptune" was secured. The charter price per month is $15,000.

THE women of the American Museum have formed a definite organization for preparedness under the name of the "American Museum War Relief Association." Committees have pushed forward the work to be done by the organization, and sewing and knitting are proceeding rapidly. Mrs. Henry Fairfield Osborn very generously contributes funds to the extent of thirty dollars a month for the purchase of the necessary materials. While certain hours are granted by the Museum for this work, each employee engaged in it donates additional time as her own personal sacrifice to the cause. Red Cross funds collected to date contain 205 subscriptions, with the work of collecting still going on.

AT a special meeting for the adult blind of New York City, held at the American Museum on the evening of June 8, Dr. G. Clyde Fisher spoke on "Wild Flowers of Summer." Boy Scout guides were provided for all those who wished such assistance. The doors were opened early in order that the visitors might have opportunity to handle the grasses, daisies, buttercups, clovers, and various other "wild flowers" so abundant in the fields of New York's suburbs that picking them for this occasion could not possibly have any influence toward extermination of the species.

THE Liberty Loan Bond committee, appointed by President Osborn some weeks ago, reports that 167 of the employees of the Museum have subscribed to the bonds, a large percentage purchasing outright and others paying by the month. The subscription already amounts to $12,850, mostly for fifty-dollar bonds. The arrangement by which the Museum is enabled to receive the subscriptions in installments was financed through the generosity of Mr. Adrian Iselin, Jr., and Mr. Felix M. Warburg, members of the board of trustees of the American Museum.

REGISTRATION for the New York State Census for the Fifteenth Assembly District was carried on at the American Museum. The work was done by the fifty-three members of the American Museum War Relief Association, under the supervision of Miss Ann E. Thomas, chairman of the committee on census. The clerical assistants worked in three shifts, the Museum giving the time of the employees during the regular hours, and the employees volunteering for the extra service. The American Museum War Relief Association is a recognized chapter of the Red Cross and also a branch of the Navy League, working daily in its workroom at the Museum on garments and equipment for soldiers and sailors.

DR. MARJORIE O'CONNELL, who has been engaged by the department of geology and invertebrate palæontology of the American Museum to work on the collection of fossil sponges as a special assistant during the spring months, has been awarded the Sarah Berliner Research Fellowship of $1,000 for the year 1917–1918, beginning June first. This fellowship was founded by Mr. Emile Berliner of Washington, D. C., in memory of his mother, and is designed to encourage gifted women who have already made a noteworthy beginning in some special field of science. Dr. O'Connell's subject for investigation will be the ecology of the European and American graptolites, extinct Hydrozoa whose habitats have heretofore been little known. In this connection she will study the large collections of these forms at the American Museum of Natural History and Columbia University.

DR. ROBERT H. LOWIE, associate curator in anthropology in the American Museum, leaves in August for California, where he will act as associate professor in anthropology during the academic year 1917–18 in the University of California at Berkeley.

AT a recent meeting of the California Academy of Sciences, Dr. Frederic A. Lucas, director of the American Museum, was elected an honorary member, together with Dr. Robert S. Woodward, president of the Carnegie Institution at Washington, and Dr. John A. Brashear, a trustee of the Carnegie Institute at Pittsburgh, Pennsylvania.

THE twelfth annual meeting of the American Association of Museums was held in New York City from May 21 to 23, with an attendance of about one hundred and fifty members representing a large number of widely scattered institutions. On May 21 and 23 the sessions took place at the American Museum of Natural History, and on May 22 at the Metropolitan Museum of Art. The guests were entertained at luncheon by the host institutions on the three days of the meeting. Chief among the topics discussed was the relation of museums to industry and education. On the evening of May 22, a reception was held at the New York Aquarium, when Dr. C. H. Townsend gave an address on the administration of a public aquarium. The week was rounded out with inspections of the other museums in the vicinity. At the business meeting for the election of officers, Mr. Paul M. Rea, of the Charlestown Museum of South Carolina, was reëlected secretary, Miss Laura L. Weeks, of the same institution, assistant secretary, Dr. W. P. Wilson, of the Philadelphia Commercial Museum, treasurer. Mr. Roy W. Miner, of the American Museum, and Miss Anna B. Gallup, of the Children's Museum of Brooklyn, were elected councilors for a term of three years. The president and vice-president of the association, elected last year for a term of two years, are Dr. Henry R. Howland, of the Buffalo Society of Natural Sciences, and Dr. Newton H. Carpenter, of the Art Institute of Chicago.

AN exhibit of the Keramic Society of Greater New York, held at the American Museum from April 25 until May 6, showed pottery and chinaware of design inspired by the Museum's collections of the primitive art of the Americas. The society, with a membership of one hundred, meets regularly in the Museum, under direction of Mr. Marshall Fry, to study design applicable to ceramics. At the last business meeting of the Keramic Society, Dr. Frederic A. Lucas was elected honorary president.